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zSeries 800

Installation Manual for Physical Planning

2066-IMPP-04

Level 04a, June 21, 2004

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zSeries 800

Installation Manual for Physical Planning

2066-IMPP-04

Level 04a, June 21, 2004

Note!

Before using this information and the product it supports, be sure to read the general information in Appendix E, “Notices,” on page E-1.

Fifth Edition (May 2004)

| This edition, 2066-IMPP-04, applies to the IBM® zSeries™ Processors. This edition replaces 2066-IMPP-03. A
| technical change to the text or illustration is indicated by a vertical line to the left of the change.

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Safety and Environmental Notices

Safety Notices

Safety notices may be printed throughout this guide. **DANGER** notices warn you of conditions or procedures that can result in death or severe personal injury. **CAUTION** notices warn you of conditions or procedures that can cause personal injury that is neither lethal nor extremely hazardous. **Attention** notices warn you of conditions or procedures that can cause damage to machines, equipment, or programs.

There are no **DANGER** notices in this manual.

World Trade Information

Several countries require the safety information contained in product publications to be presented in their national languages. If this requirement applies to your country, a safety information booklet is included in the publications package shipped with the product. The booklet contains the safety information in your national language with references to the US English source. Before using a US English publication to install, operate, or service this IBM product, you must first become familiar with the related safety information in the booklet. You should also refer to the booklet any time you do not clearly understand any safety information in the US English publications.

Laser Safety Information

All zSeries models can use I/O cards such as PCI adapters, ESCON, FICON, OSA-Express, InterSystem Coupling-3 (ISC-3), or other I/O features which are fiber optic based and utilize lasers or LEDs.

Laser Compliance

All lasers are certified in the U.S. to conform to the requirements of DHHS 21 CFR Subchapter J for class 1 laser products. Outside the U.S., they are certified to be in compliance with the IEC 825 (first edition 1984) as a class 1 laser product. Consult the label on each part for laser certification numbers and approval information.

CAUTION:
All IBM laser modules are designed so that there is never any human access to laser radiation above a class 1 level during normal operation, user maintenance, or prescribed service conditions. Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. Only trained service personnel should perform the inspection or repair of optical fiber cable assemblies and receptacles.

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Environmental Notices

Product Recycling and Disposal

This unit contains materials such as circuit boards, cables, electromagnetic compatibility gaskets and connectors which may contain lead and copper/beryllium alloys that require special handling and disposal at end of life. Before this unit is disposed of, these materials must be removed and recycled or discarded according to applicable regulations. IBM offers product-return programs in several countries. Information on product recycling offerings can be found on IBM's Internet site at *http://www.ibm.com/ibm/environment/products/prp.shtml*.

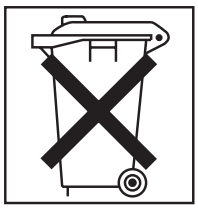
IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of programs and services to assist equipment owners in recycling their IT products. Information on product recycle offerings can be found on IBM's Internet site at *http://www.ibm.com/ibm/environment/products/prp.shtml*.

Battery Return Program

This product may contain sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery(s). Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to *http://www.ibm.com/ibm/environment/products/batteryrecycle.shtml* or contact your local waste disposal facility.

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and other battery packs from IBM Equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Please have the IBM part number listed on the battery available prior to your call.

In the Netherlands, the following applies:



Cable Warning

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. ***Wash hands after handling.***

About This Publication

This publication contains information necessary for planning the physical installation of the zSeries 800 system.

- Chapter 1 provides an introduction to planning for your system and a planning checklist.
- Chapter 2 gives plan views, service clearances, weight distribution, cooling information, and floor cutouts for the system.
- Chapter 3 provides power information.
- Chapter 4 includes information on hardware management console and support element communications.
- Chapter 5 contains remote support facility installation planning.
- Chapter 6 discusses cable connectivity information.
- The Appendices provide IBM standard symbols, environmental specifications, acoustics, and power installation and power loads.

Related Publications

The following publications may also be used with this publication, depending on the specific system configuration:

- *System Overview*, SA22-1028
- *OSA Express Customer's Guide and Reference*, SA22-7476
- *Planning for: S/390® Fiber Optic Links (ESCON®, FICON™, and Coupling Links)*, GA23-0367
- *Introducing Enterprise Systems Connection*, GA23-0383
- *Planning for Enterprise Systems Connection Links*, GA23-0367
- *LAN Cabling System Planning and Installation Guide*, GA27-3361
- *IBM S/390 FICON Migration Guide*, SG24-5169
- *FTS Direct Attach Physical and Configuration Planning Guide*, GA22-7234
- *IBM 7852 Modem Model 400 External Data/Fax Modem Technical Reference*, 76H2773
- *IBM 7852 Modem Model 400 External Data/Fax Modem Installation Guide*, 76H2772
- *IOCP Users Guide*, SB10-7029

In addition to these printed references, there is general computer room planning information on IBM's Resource Link web site.
(http://www.ibm.com/servers/resourcelink)

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Education

To assist in a smooth transition to your new system, it is recommended that your educational plans include some preliminary training for using the Hardware Management Console interface. This education should be provided for operators, system programmers and other users of the Hardware Management Console.

To learn about the interface, consider including the following items for user education prior to system arrival:

- *Learning To Use the S/390 CMOS Console*, SK2T-0001
- *Hardware Management Console Operations Guide* (See Resource Link™ for the form number and level that supports the Version of code you are using).
- *Support Element Operations Guide* (See Resource Link for the form number and level that supports the Version of code you are using).

There is additional educational material on IBM's Resource Link web site. *(http://www.ibm.com/servers/resourcelink)*

Licensed Internal Code

Licensed Internal Code is provided in accordance with the terms and conditions of the applicable IBM Customer Agreement or other applicable written agreement between the Customer and IBM.

Licensed Internal Code (LIC) is a fundamental component of the zSeries 800 and is copyrighted and licensed by IBM. Each zSeries 800 system is delivered with Licensed Internal Code that is customized to the specific machine ordered. The Licensed Internal Code enables the zSeries 800 to operate in accordance with its Official Published Specifications.

Model upgrades, feature additions, and system engineering changes may require updated Licensed Internal Code for the system. Updated Licensed Internal Code replaces the existing Licensed Internal Code.

Relocation of a zSeries 800 requires that the Licensed Internal Code be reinstalled in the server at the new location. For the procedures for relocating a zSeries 800, see the "Preparing for Relocation"section of the *zSeries 800 Installation Manual*.

How to Send your Comments

Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this document:

Send your comments by using Resource Link at *http://www.ibm.com/servers/resourcelink*. Select **Feedback** on the Navigation bar on the left. Be sure to include the name of the document, the form number, the version, if applicable, and the specific location of the text you are commenting on (for example, a page number or table number).

Chapter 1. Introduction to Planning

This chapter of the Physical Planning Manual is intended to help you with planning pre-installation activities. IBM Marketing and Installation Planning Representatives are also available to help you with installation planning. Proper planning for your new system will facilitate a smooth installation and fast system start-up.

The use of the terms, 'processor', 'system' and 'all models' in this publication refer to the zSeries 800 system.

System Planning

As part of your system planning activity, you will make decisions about where to locate your equipment, who will operate the system, and so on. A good plan ensures that the equipment and materials are ready to use when the zSeries 800 system arrives.

You should select an individual to serve as the coordinator for your planning efforts. One person is generally responsible for most or all of the system planning, but it is also possible to divide the responsibilities among other people in your business.

The type of software (operating system and application programs) that you intend to use must support the features and devices on the system. You should already be familiar with your software requirements, but may want to contact your IBM marketing representative for information on planning for the software.

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Planning Checklist

This checklist identifies installation tasks and responsibilities sequentially. If you have to renovate your site, you will need a longer planning cycle.

Task/Consideration	Task Assigned (check)
Checkpoint 1	
Designate a person in your organization with the responsibility for all phases of site preparation.	_____
Review all site planning information with the designated person. Determine who will actually perform each site preparation task and mark this checklist.	_____
Plan for the installation of the device cables between the devices and the processor. Before leaving this checkpoint step, turn to Chapter 6, “Cabling and Connectivity,” on page 6-1 and read the information now about planning for future cable needs and the “zSeries Fiber Cabling Service” on page 6-1	_____
Determine the schedule with your IBM marketing representative. Fill in the dates on this form.	_____
Identify communication needs and the source for the communication lines. Identify modem needs.	_____
Checkpoint 2	
Lay out the floor plan. Show the locations of the processor, control units, work stations, modems, power outlets, and accessories. If you are planning a new computer room, information contained on IBM’s**Resource Link** web site (*http://www.ibm.com/servers/resourcelink*) may be helpful. See ″General Information for Planning a Physical Site″. If you are planning an installation on a non-raised floor, ask your marketing representative if your system requires cables designed to reduce electronic noise interference.	_____
Review the overall site preparation plan.	_____
Place orders for cables. See Chapter 6, “Cabling and Connectivity,” on page 6-1	_____
Contact the IBM zSeries Fiber Cabling Service (FCS) for assistance. FCS will help you plan for the cabling solution that meets your individual system requirements. Your marketing representative will provide you with the information necessary to contact FCS.	_____
Checkpoint 3	
Determine if the existing programs need changes. Schedule changes as required.	_____
Determine if any existing devices and control units need changes. Schedule changes as required.	_____
Arrange for installing the device cables between the work stations, controllers, and modems.	_____
Arrange for installing the power receptacles and wiring.	_____
Define a training program for employees.	_____
Use Resource Link (*http://www.ibm.com/servers/resourcelink*) to obtain required manuals (such as *System Overview*,*IOCP Users Guide*,*PR/SM™ Planning Guide*). See your IBM marketing representative for specific manuals you may need.	_____
Checkpoint 4	
Review the progress of the data communication plan. Identify and resolve any schedule conflicts.	_____
Review the system configuration to ensure the configuration meets your requirements Make necessary changes.	_____
Checkpoint 5	
Review the installation plan and define any points in the schedule that may cause a problem.	_____

Task/Consideration	Task Assigned (check)
If you have elected to do your own I/O cabling, as cables begin to arrive, start installing and labeling them. Label power receptacles as they are installed.	_____
Start employee training.	_____
Complete the Systems Assurance Product Review with your IBM marketing representative or Business Partner and the system installers.	_____
Carefully measure the delivery path from the shipper drop-off point to the install location. Accurate measurements now may prevent installation delays later. See Figure 2-2 on page 2-4	_____
Checkpoint 6	
Prepare IOCP input statements or HCD definitions.	_____
If you intend to remap CHPID numbers when your zSeries 800 system is installed, use the CHPID Mapping Tool on **Resource Link** to create a diskette with your CHPID assignments. (Go to*http://www.ibm.com/servers/resourcelink*).	_____
If you have elected to do your own I/O cabling, complete the checkout of system cables as much as possible. Verify that the cables are properly routed, protective end caps are in place, that the processor ends of the cables are safely out of the way for system installation, and that cable safety procedures are followed.	_____
Complete the checkout of the power cables. Test for continuity and polarity, proper grounding, correct phase wiring, and general power safety considerations.	_____
Complete the required changes to the existing programs and data processing units.	_____
Complete the site preparation.	_____
Install communication facilities, such as telephone lines and modems.	_____
Review setup instructions with setup personnel.	_____
Arrival of Unit(s)	
Move unit(s) to installation location. Unpack unit(s) according to instructions.	
Call your service provider to install the unit(s).	

You may want to make copies of the Planning Schedule for others assisting in the system installation planning. This might include IBM personnel assisting with the planning process, service providers, vendors, and others in your business who require planning updates.

Chapter 2. Models and Physical Specifications

This chapter provides the following detailed information for zSeries 800s.

- Model and frame descriptions
- Plan view and specifications
- Weight distribution data and service clearances information
- Shipping specifications

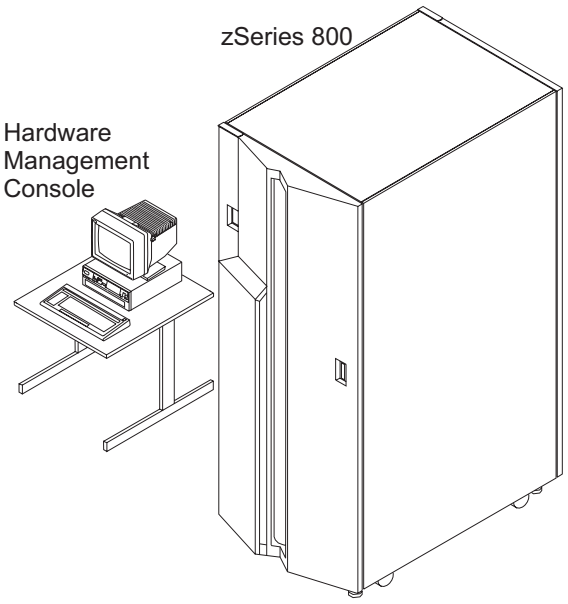

Figure 2-1. Typical zSeries 800 system

All zSeries 800 models are constructed using building blocks called ″cages″ that mount in a ″frame″. A processor (CPC) cage is always placed in the top position of the frame. Input/Output adapters are installed in a second cage, added to the bottom of the frame.

Because of the large number of cables that can be connected to a zSeries 800 system, installation on a raised floor is strongly recommended.

If you are planning an installation on a raised floor in Canada, the installation must be in accordance with Section 12-020 of the CEC. Certain limitations may apply to non-raised floor applications. In any country, refer to your national electric code if you have questions about routing data processing cables in exposed areas.

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General Installation Manual for Physical Planning

Information contained on IBM's **Resource Link** web site (*http://www.ibm.com/servers/resourcelink*.) may be helpful in planning for your raised floor. See ″General Information for Planning a Physical Site″.

The GIMPP covers the following topics :

Site Installation Coordinator
- Oversees the installation
- Selects contractors and vendors
- Sets and maintains the schedule

Site Selection
- Utility availability
- Environmental considerations
- External access to the site
- Internal access within the site
- External and internal facilities
- Expansion potential

Flooring
- Non-raised floor construction
  - Floor coverings in data center
  - Static electricity
- Raised floor construction
  - Vertical underfloor space
  - Sealed floor
  - Floor panel weight capacity
  - Pedestal system
  - Stringers
  - Grounding
  - Cabling provision
  - Expansion Potential

Emergency Planning
- Monitor environment
  - Computer room
  - Air conditioning equipment
  - Electrical supply
- Periodic inspections
- Hazard prevention/protection
  - Fire
  - Water
  - Lightning
  - Chemical
- Personnel training
  - Emergency plans
  - Emergency equipment
  - Emergency shutdown
  - Emergency evacuation
  - Emergency contacts
- Alarms
- Disaster backup plans

Space and Layout
- Obstacles (walls, columns, etc)
- Weight distribution
- Floor loading
- Machine area
- Service clearance
- Cable placement
  - Restrictive cable lengths
- Power access
- Safety equipment
- Facilities access
- Operator space and facilities
- Work flow
  - Entrances/exits
  - Loading dock access
  - Hallways/doorways
  - Ramps
- Lighting
- Acoustics
- Electro Magnetic Interference
- Proximity to hazards
  - Potential water damage
  - Shock and vibration
  - Chemical hazards
  - Fire danger
  - Lightning protection
- Office space
- Storage space
- Supplies space

Power Considerations
- Dual power installation
  - Proper phase rotation
  - Proper wire size and color
- Watertight power connectors
- Proper grounding
- Adequate circuit breakers
- Emergency power shutoff
  - EPO switch
  - UEPO switch
- Backup system power
  - Uniterruptible power supply
  - Surge protection
  - Brownout protection
  - Lightning protection
- Emergency lighting
- Service and utility outlets
- Obvious labeling

Models

Table 2-1. Processor and Coupling Facility Models

5 PU Models	CPs	SAPs	Spares	Mandatory IFLs
0E1	1	1	2	1
0E1 (Japan Only)	1	1	3	0
0A1	1	1	3	0
0B1	1	1	3	0
0C1	1	1	3	0
0X2	2	1	2	0
001	1	1	3	0
0A2	2	1	2	0
002	2	1	2	0
003	3	1	1	0
004	4	1	0	0
Coupling Facility or **Integrated Facility for Linux**				
0CF or 0LF[1]	1	1	3	0
	2	1	2	0
	3	1	1	0
	4	1	0	0

Notes:
1. The 0CF and 0LF models can be 1-4 way PUs

Physical Dimensions

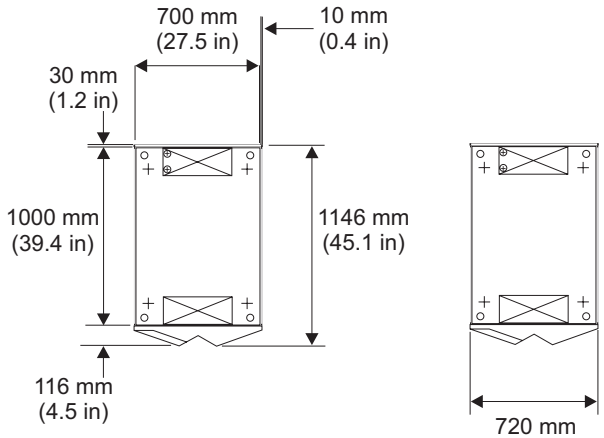
Table 2-2. System Frame Specifications

Packaging	Width mm (in)	Depth mm (in)	Height mm (in)	Weight kg (lb)
Frame w/o Covers	700 (27.5)	1000 (39.4)	1810 (71.3)	470 (1036)
Frame w/ Covers	720 (28.3)	1146 (45.1)	1810 (71.3)	545 (1201)

Table 2-3. System Cover Weights

Cover Description	Weight kg (lb)	Usage
Side Covers	17.91 (39.5)	(2 per frame)
Front Cover	24.94 (55)	(1 per frame)
Rear Cover	14.06 (31)	(1 per frame)

Plan View



Frame Entry/Exit	Dimension	
	(mm)	(in)
Front	165 x 381	6.5 x 15.0
Rear	165 x 381	6.5 x 15.0

Figure 2-2. System Dimensions

Weight Distribution and Service Clearance

Weight Distribution

The following table shows weights and dimensions used to calculate floor loading for zSeries 800 systems. All floor loading calculations are intended for a raised floor environment.

Table 2-4. zSeries 800 Maximum Frame Weight, Width, and Depth Used for Floor Loading Calculations

Weight kg (lbs)	545 (1201)
Width mm (in)	700 (27.5)
Depth mm (in)	1000 (39.4)
Note: Weight includes covers. Width and depth are indicated without covers.	

If you are planning an installation on a non-raised floor, contact a qualified consultant or a structural engineer regarding your location choice to make sure the floor is strong enough to support the weight of the machine.

The following figure and table show sample floor loading values for a zSeries 800 system.

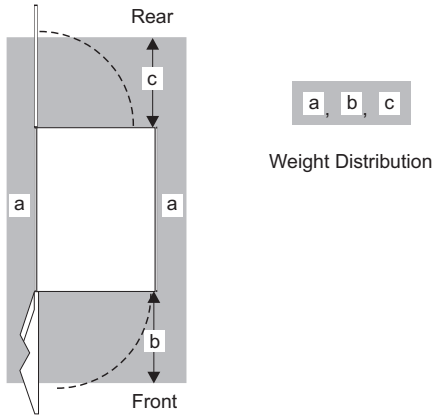


Figure 2-3. System Weight Distribution

Table 2-5. Weight Distribution and Floor Loading

Example #	'a' mm (in)	'b' mm (in)	'c' mm (in)	Weight kg/m^2(lbs/f^2)
Example 1	10 (0.4)	116 (4.5)	30 (1.2)	718.6 (147.2)
Example 2	381 (15.0)	381 (15.0)	381 (15.0)	313.3 (64.2)
Example 3	381 (15.0)	508 (20.0)	508 (20.0)	289.2 (59.2)
Example 4	381 (15.0)	635 (25.0)	635 (25.0)	270.5 (55.4)
Example 5	381 (15.0)	762 (30.0)	762 (30.0)	255.6 (52.3)
Example 6	508 (20.0)	508 (20.0)	508 (20.0)	264.5 (54.2)
Example 7	635 (25.0).	635 (25.0)	635 (25.0)	232.2 (47.6)
Example 8	762 (30.0)	762 (30.0)	762 (30.0)	209.8 (43.0)

1. All measurements are taken from the outside edge of the machine frame, without covers, unless specifically described otherwise.
2. Example 1 of the table shows floor loading for a maximum-weight frame *in storage*, where there is no space between frames on all four sides, and *covers are installed*. The 'a', 'b', and 'c' dimensions represent the depth of the covers. When a system is stored, with no spaces between frames, the floor load rating should be at least 1000 kg/m^2 (200 lb/ft^2).

If weight distribution clearances are overlapped, the customer should obtain the services of a qualified consultant or structural engineer to determine floor loading.

Service Clearance

Under typical conditions,service clearances of adjacent products may be overlapped but weight distribution areas should not be overlapped. Regardless of floor loading, minimum service clearances must be observed. The zSeries 800 requires **762 mm (30 in)** of service clearance on **all four sides** of the machine.

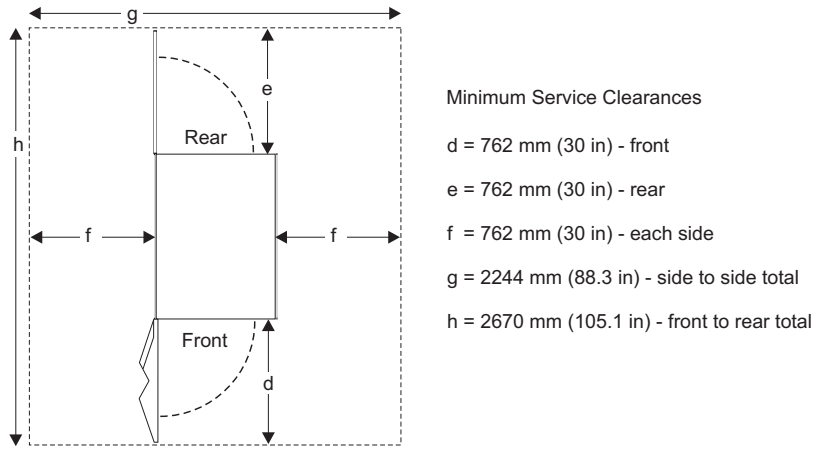

g
e
h
Rear
f
f
Front
d
Minimum Service Clearances
d = 762 mm (30 in) - front
e = 762 mm (30 in) - rear
f = 762 mm (30 in) - each side
g = 2244 mm (88.3 in) - side to side total
h = 2670 mm (105.1 in) - front to rear total

Figure 2-4. System Service Clearance

The system requires specific service clearances to insure the fastest possible repair in the unlikely event that a part may need to be replaced. Failure to provide enough clearance to open the front, rear, left, and right side covers will result in extended service time.

Machine and Service Clearance Areas

Machine area is the actual floor space covered by the system. Service clearance area includes the machine area, plus additional space required to open the covers for service access to the system. For the zSeries 800 system, machine area is 0.83 M^2 (8.9 ft^2), and the service clearance area is 5.99 M^2 (64.5 ft^2).

Notes:

1. Machine area includes installed covers.
2. Service clearance area must be free of all obstacles. Units must be placed in a way that all service areas are accessible. The weight distribution clearance area extending beyond the service clearance area, such as the area at the outside corners of the units, may contain support walls and columns.

Cooling Requirements and Floor Cutouts

The zSeries 800 system requires 11.1 m^3/min. (400 f^3/min.) of chilled airflow from under the raised floor for adequate cooling. Air flows through the machine from bottom to top, exiting at the top of the rear cover. Heated exhaust air should exit the computer room above the computing equipment. If your computer room uses hot and cold aisles, the front of the machine should face a cold aisle.

If you are planning an installation on a non-raised floor, refer to Appendix B, “Environmental Specifications,” on page B-1 for the environmental conditions you must provide to ensure proper machine operation. After reviewing the environmental information, return to “Considerations for Multiple System Installations” on page 2-9 read the information about ″**Inter-system cabling**″, and continue from there.

Important

Depending on the panel type, additional panel support pedestals may be required to restore structural integrity of the panel. Consult the panel manufacturer to insure that the panel can sustain a concentrated load of 181.4 kg (400 lbs) per caster. It is possible that one floor panel will bear two casters producing loads as high as 362.8 kg (800 lbs) on the panel.

The following illustration shows the recommended placement of the zSeries 800 on a typical raised floor.

- Perforated floor tiles are placed on either side of the frame, providing good airflow.
- With this floor placement, the cutout panels are identical.
- Note that this placement puts two casters each on panels B1 and B3. Additional pedestals may be positioned at the corners marked with asterisks in the illustration.

It is possible to place a perforated panel in position B2 instead of positions A2 and C2. This is not recommended because humidity and dust from under the raised floor could affect performance of the air filters in the bottom of the frame.

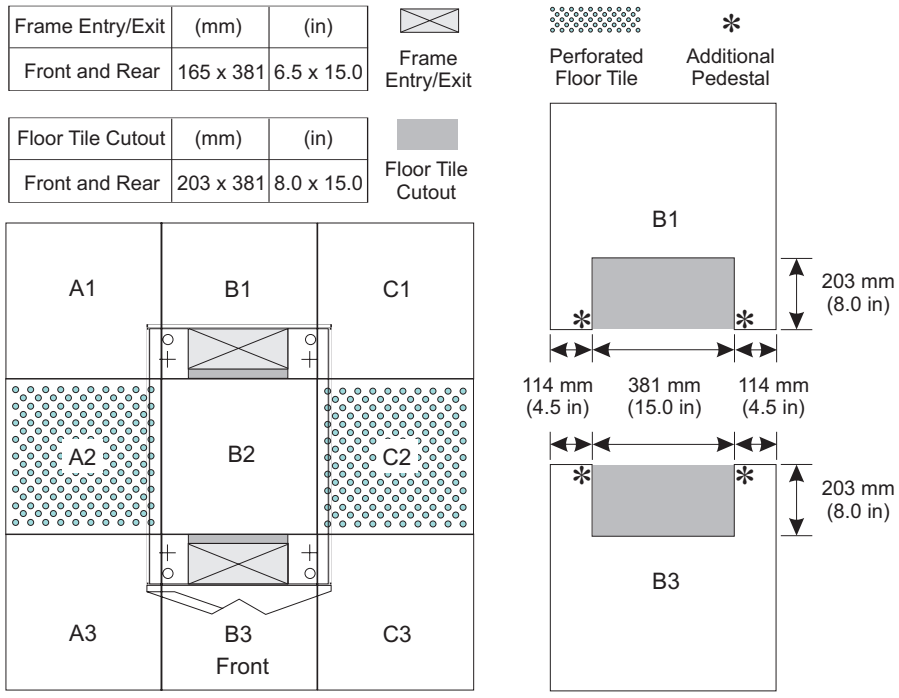


Figure 2-5. Raised Floor Placement

- Ensure adequate floor space is available to place the frames over the floor panels exactly as shown in the drawing. Refer to “Plan View” on page 2-4 “Weight Distribution” on page 2-4 and “Service Clearance” on page 2-5for front-to-back and side-to-side clearances. Consider all obstructions above and below the floor.
- Cut two floor panels. Additional panel supports (pedestals) may be required to restore the structural integrity of the panel.

- Raised floor cutouts should be protected by electrically nonconductive molding, appropriately sized, with edges treated to prevent cable damage and to prevent casters from rolling into the floor cutouts.

  When cutting the panels, you must adjust the size of the cut for the thickness of the edge molding you are using. The dimensions shown are finished dimensions.
- Use Figure 2-5 on page 2-7 to install the panels in the proper positions.

Casters

The following illustration shows the physical dimensions around the casters. When planning for both the movement and positioning of the system, be aware that each caster swivels in a circle slightly larger than 125 mm (5 in) in diameter. Exercise caution when working around floor cutouts.

Frame - Caster Dimensions

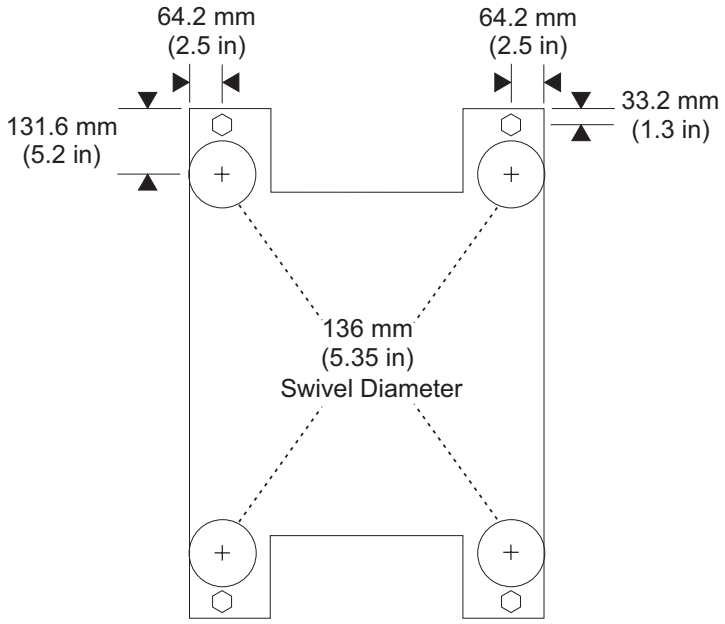


Figure 2-6. Frame-Caster Dimensions

Considerations for Multiple System Installations

When integrating a zSeries 800 system into an existing multiple-system environment, or when adding additional systems to an installed zSeries 800, consider the following factors:

- **Thermal interactions**

  When positioning a zSeries 800 system on your raised floor, place the machine so that the air supplied by the perforated floor tiles is delivered only to this system. The illustration shows how to include a zSeries 800 in an existing arrangement, allowing for both the required service clearance and adequate air flow.

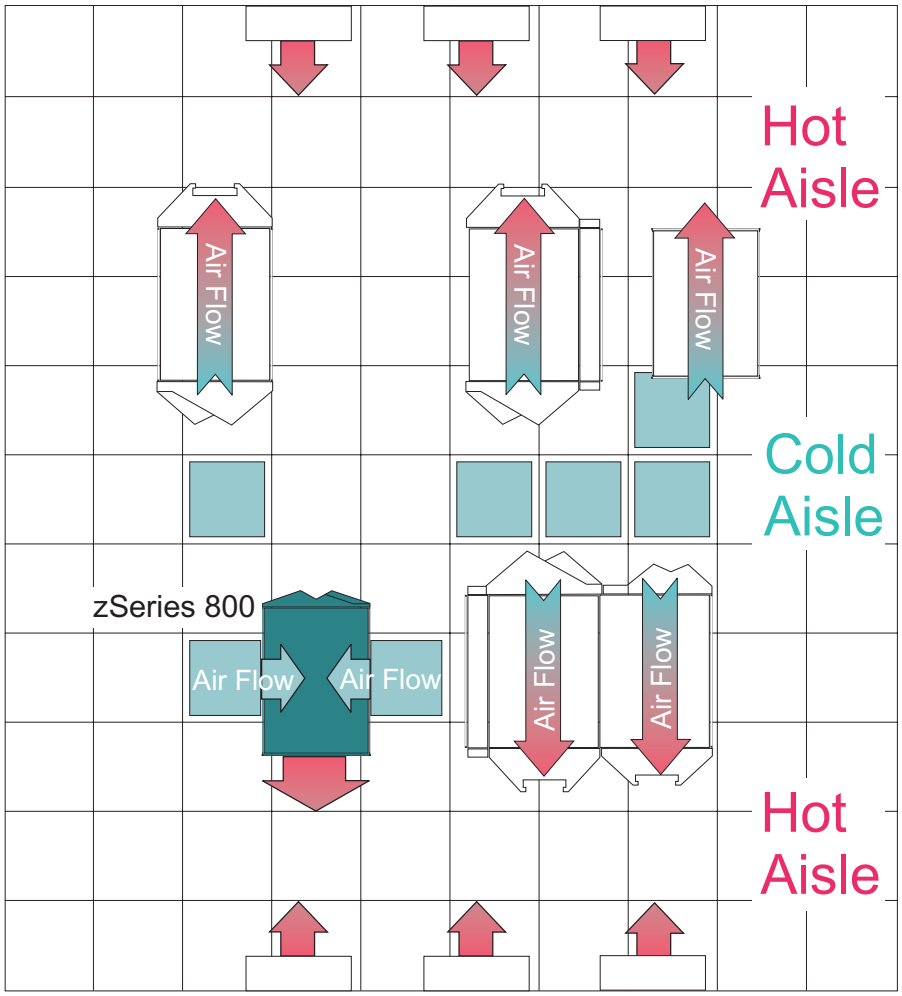


Figure 2-7. Multiple System Thermal Interaction

- **Floor loading**

  When trying to optimize floor space utilization, floor loading may become overlapped. Obtain the services of a qualified consultant or structural engineer if you are uncertain of the weight distribution on your raised floor.

- **Inter-system cabling**

  Integrated Cluster Bus (ICB) cables linking systems together are limited to 10 meters (33 ft) in length. Because some of that length is used under the covers of

the connected systems to reach internal plugging points, the usable length of these system links is further reduced to a maximum of 7 meters (23 ft). See Figure 6-11 on page 6-19

Shipping Specifications

In the U.S. and Canada, zSeries 800 systems are shipped with external cardboard and plastic packaging, and roll on their own casters.

zSeries 800 systems are shipped on pallets for World Trade delivery. The pallet includes a ramp to roll the machine off of the pallet. For shipment to some Asia/Pacific countries the system is protected with a wooden shipping crate. Packaging for both World Trade and A/P requires commercial lift transportation.

Review the packaged product dimensions and your site specifications to determine if the zSeries 800 will need to be unpacked before it can be moved into its install position.

Table 2-6. Shipping Specifications

Packaging	Width mm (in)	Depth mm (in)	Height mm (in)	Weight kg (lb)
Domestic	746 (29.4)	1299 (51.1)	1810 (71.4)	556 (1225)
World Trade	908 (35.8)	1359 (53.5)	2042 (80.4)	608 (1340)
Crated Frame	870 (34.3)	1318 (51.9)	1318 (51.9)	649 (1430)

Chapter 3. Power Requirements

General Requirements

zSeries 800s require a minimum of 2 customer power feeds:

1. Two identical (redundant) feeds for the frame
2. One duplex service outlet positioned within five feet of the machine frame.

The service outlets require standard 100V to 130V or 200V to 240V, 50/60Hz, single-phase power.

zSeries 800s operate with:

- 50/60Hz AC power
- Voltages ranging from 200V to 240V
- Single-phase wiring

Power Installation Considerations

zSeries 800s operate from two fully-redundant single-phase line cords. These redundant line cords allow the system to survive the loss of customer power to either line cord. If power is interrupted to one of the line cords, the other line cord will pick up the entire load and the system will continue to operate without interruption. Therefore each line cord is intended to be be wired to support the entire power load of the system.

Important

Each power cord is intended to be supplied by a different source.

Since the zSeries 800 operates on single-phase power, power redundancy is realized **only** if the source to each line cord is different. Failure to provide separate power sources will lead to system failure in the event of a power outage. See Appendix D, “Dual Power Installation,” on page D-1 for examples of typical redundant facilities wiring.

The power supplies at the front end of the system use active resistive load synthesis. Harmonic distortion of the current waveform is small enough that it need not be considered in planning the installation. The power factor is typically 0.95.

Power Specifications

Table 3-1. Power Supply Ranges and Tolerances

Supply Type	Nominal Voltage Range (V)	Voltage Tolerance (V)	Frequency Range (Hz)
Two redundant single-phase line cords	200-240	180-254	47-63

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Table 3-2. System Power Rating

Models	Source Type	Frequency	Input Voltage Range	Rated Input Current
All	Single-phase	50/60 Hz	200 - 240V	16A

Notes:

1. The power factor is approximately 0.95.
2. Maximum system power is 2.95 kW.
3. Maximum kBTU/hr is 10.0 kBTU/hr.

Power Plugs and Receptacles

Plugs are shipped with the machine line cords in USA and Canada. The line cord lengths are 4250 mm (14 ft.) except in Chicago, Illinois, USA where the length is 1830 mm (6 ft.). Power plugs in the following table are approved for use with specified models and meet the relevant test laboratory or country/test-house standards. The power plug must be connected to a correctly wired and grounded receptacle.

The customer is responsible for receptacle wiring. In the U.S., Canada and Japan, contact the vendor of your choice and provide the information (including Note 1) for the receptacles from the following table.

For countries that require other types of plugs or receptacles, the system is shipped without plugs on the line cords, and you are responsible for supplying and installing both plugs and receptacles. Use the voltage and description information from the table below (including Note 2) when contacting your vendor of choice.

Table 3-3. Power Plugs and Receptacles - 200-240 Volts

Feature Code	Voltage	Description	Watertight Plug	Watertight Receptacle
2700 1.83 m (6 ft) Line Cord (Chicago Only)	200V - 240V	Dual line cords Single-phase 200-240 VAC nominal 2 pole / 3 wire 20 Amp	IEC-309 20 Amp	IEC-309 20 Amp Type 320R6W [1]
2701 4.27 m (14 ft) Line Cord (U.S./Canada)	200V - 240V	Dual line cords Single-phase 200-240 VAC nominal 2 pole / 3 wire 20 Amp	IEC-309 20 Amp	IEC-309 20 Amp Type 320R6W [1]
2702 4.27 m (14 ft) Line Cord (World Trade)	200V - 240V	Dual line cords Single-phase 200-240 VAC nominal 2 pole / 3 wire 20 Amp	Not Provided[2] Cut-end power cords must be electrician-installed.	Not Provided[1,2]

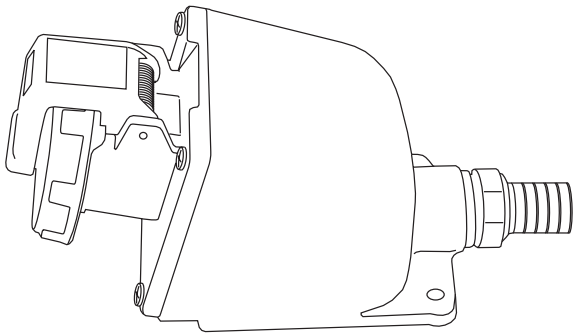
Table 3-3. Power Plugs and Receptacles - 200-240 Volts (continued)

Feature Code	Voltage	Description	Watertight Plug	Watertight Receptacle

Notes:

1. IBM continues to strongly recommend the use of a metal backbox (example shown below) with our line cords using IEC-309 plugs. Although in-line connectors and nonmetalic backboxes are available and compatible, they are not recommended. These recommendations are based on the metal backbox providing:
   - An added level of protection against a miswired phase and ground reversal
   - In some cases, a metal backbox may be better for EMI mitigation

   You may choose not to use a metal backbox. In this case, please check your local code for specific requirements.
2. The customer must obtain appropriate plugs and receptacles, based on existing electrical codes, where those plugs and receptacles are not provided with the system.



Grounding Specifications

Every single-phase branch circuit must contain two phase conductors (or one phase and neutral) and an insulated equipment-grounding conductor.

For 200 V ac through 240 V ac installations in the United States, the equipment-grounding conductor must be identical in size, insulation material, and gauge to the branch circuit phase conductors, except that it must be green with or without one or more yellow stripes on the insulation. For installations outside the United States, the size of the grounding conductor must be in accordance with local codes.

Conduit must not be used as the only grounding means. However, any conduit or cable shield must be connected at both ends in such a way that it is included in the grounding path in parallel with the grounding conductor it contains. IBM strongly recommends that branch circuit wiring be located in metallic conduit, or be made from shielded cable, if located under a raised floor. Even when not required by local regulations, some form of shield around the branch circuit wiring is preferred as a means of reducing coupling of high-frequency electrical noise into signal and control cables.

There is information about additional recommendations and requirements for equipment grounding on IBM's **Resource Link** web site (*http://www.ibm.com/servers/resourcelink*). See ″General Information for Planning a Physical Site″.

Line Cord Wire Specifications

Table 3-4. Line Cord Specifications

Feature	Style (AWG/Number of connections)	Number of Shields	Bulk Outside Diameter mm (in)
Low Voltage (200V - 240V)	12/3 (single-phase) 2.5 mm 2 (#12 AWG) 20 AMP	1	11.3 (0.445)

Line Cord Physical Protection

In US installations, the line cord must meet National Electric Code (NEC) requirements. **If you are planning an installation on a non-raised floor,** when line cords are run on the surface of the floor, they must be protected against physical damage (See NEC 645-5). For other countries, local codes apply.

Line Cord Wire Colors

The zSeries 800 power cords use the following wire colors:

Domestic (supplied with plug)
- Line 1 Brown
- Line 2 Black
- Ground Green/yellow

EMEA, AP, and all others (supplied without plug)
- Line 1 Brown
- Line 2 Blue
- Ground Green/yellow

Customer Circuit Breakers (CBs)

The maximum permissible CB rating is 20A. In geographic areas where the breaker sizes given are not available, the standard size circuit breaker giving the closest higher numerical value of current rating should be used.

It is recommended that a 20A CB for 200-240V be used for **each** of the two system power feeds.

There is no requirement for a delayed circuit breaker protecting the AC supply to the z800, but if you are preparing a new installation site, a delayed circuit breaker is recommended.

Service Outlet (Customer-Supplied)

A duplex service tool outlet should be installed within 1.5 m (5 ft) of the system frame. The power requirement is 110V/120V for USA and Canada (other power requirements are country dependent). The service tool outlet should be placed on it's own circuit breaker so it can be used when the processor frame circuit breaker is off.

Unit Emergency Power Off (UEPO)

There is a unit emergency power off (UEPO) switch on the front of the frame. When tripped, the UEPO switch will immediately disconnect utility power (AC voltage) from the machine. All volatile data will be lost.

IMPORTANT

This switch is not intended to be used for normal power-off/power-on activities.

It is for **emergency use only**.

A customer service representative must reset the AC power circuit breakers inside the machine after the UEPO switch has been used. The zSeries 800 will be inoperable until these circuit breakers are reset.

Chapter 4. Hardware Management Console and Support Element Communications

Support Element

The zSeries 800 is supplied with a pair of integrated ThinkPad support elements (SE). One is always active while the other is strictly an alternate. Power for the support elements is supplied by the processor frame, and there are no additional power requirements.

Each SE comes with two communication adapters included. The default combination is one Token Ring adapter and one Ethernet adapter (FC0086). The alternate choice is both SEs with dual Ethernet adapters (FC0087). Regardless of which pair of adapters you choose, both SEs will be configured the same.

If you order the Token Ring-Ethernet default combination, a Multistation Access Unit (MAU) is required to operate the Token Ring LAN. The MAU is installed in the A frame and requires no power.

Note: zSeries 890 and 990 are the last zSeries servers that will support Token Ring LAN connection to the Support Elements.

If you order your system with dual Ethernet adapters for each support element, an Ethernet switch is required instead of a MAU. The switch is supplied with **every** system order under Feature Code 0089.

Note: If you already have an Ethernet switch, or plan to use a Token Ring LAN, you should deselect FC0089 to avoid receiving another switch.

Two 15.24 meter (50 ft) Ethernet cables are supplied to connect the Support Elements to your LAN.

You will need to provide a 110/120V power source for the Ethernet switch.

Hardware Management Console

A Hardware Management Console is required to operate a zSeries 800 processor. A single console can support multiple S/390 and zSeries processors and can be located remotely to the physical processor sites.

The Hardware Management Console comes with two LAN communication features supplied.

- FC0078 is the default selection when you are placing your system order. FC0078 comes with a Token Ring/Ethernet combination.

  Note: zSeries 890 and 990 are the last zSeries servers that will support Token Ring LAN connection to the Hardware Management Console.
- FC0077 is the optional alternative and must be selected. FC0077 comes with Dual Ethernet connections.

The console requires a customer-supplied table to hold the following:

17-inch display monitor, 15.9 inches viewable (FC6092) or 21-inch display monitor, 19.8 inches viewable (FC6093)

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7852-400 modem or equivalent (for remote service support)

System Unit (processor, keyboard and mouse)

The Hardware Management Console requires three 110/120V outlets for USA and Canada. (Other power requirements are country dependent.)

FC0078 and FC0077 use DVD to install LIC. If you have a Hardware Management Console with DVD-capability, you may be able to reuse it on your zSeries 800 system.

LAN Connections

Shipped as a LAN connection package, your system will arrive with the following LAN cables for connecting the console to your network:

Type	Description	Part Number	Quantity
Ethernet	15.24 m (50 ft)	05N5292	1
Token Ring	2.44 m (8 ft)	11P0891	1
Token Ring	22.86 m (75 ft)	11P0892	1
Token Ring	Wrap Plug	6165899	1

One end of the Token Ring cable **P/N 11P0891** plugs into the D-shell connector on the Token Ring LAN adapter card installed in the Hardware Management Console. The other end of this cable connects to the data port on the MAU (an RJ-45 connector). If the MAU is further away from the console than 2.44 m (8 ft), use Token Ring cable **P/N 11P0892** to connect to P/N 11P0891, providing an additional 22.86 meters (75 feet) of cable length to reach your existing Token Ring LAN. P/N 11P0892 has RJ-45 connectors on both ends.

Token Ring LANs can operate at 4 or 16 Mbps. The Token Ring cables shipped with your console are Unshielded Twisted Pair (UTP) cables that support a link data rate of either 4 or 16 Mbps.

Ethernet cable **P/N 05N5292** connects to either the Ethernet adapter card installed with FC0077 or to the Ethernet connector on the connector panel of the processor unit. This cable has RJ-45 connectors on both ends.

Ethernet LANs can operate at 10, 100, or 1000 Mbps. The Ethernet cable that shipped with your console is Category 5 Unshielded Twisted Pair (UTP) cable that supports a link data rate up to 1000 Mbps.

Hardware Management Console and Support Element Wiring Options

A local Hardware Management Console must be connected to its Support Elements using Local Area Network (LAN) wiring. zSeries 800s provide both Token Ring and Ethernet options for the LAN wiring between the Hardware Management Console and the Support Elements. The necessary LAN adapters for the Support Elements and the Hardware Management Console may be specified as features on the system order.

In the Support Elements, one Token Ring adapter and one Ethernet adapter are included as standard. Two Ethernet adapters may be specified as an optional feature. This eliminates the Token Ring adapter and replaces it with a second Ethernet adapter.

In the Hardware Management Console, one Ethernet adapter is included as standard, and one Token Ring adapter is available as an optional feature.

This combination of adapter options leads to 4 possible wiring scenarios:
- Token Ring only
- Ethernet only, one path
- Ethernet only, two paths
- Token Ring and Ethernet

Notes on wiring with multiple adapters:

1. It is intended that a Hardware Management Console and an SE be connected by **only one LAN**
2. Multiple adapters in a Hardware Management Console allow that Hardware Management Console to connect with two **independent** sets of SEs, one set on a Token Ring and a second set on an Ethernet.

   This is done to allow for migration from Token Ring environments to Ethernet environments.
3. Multiple adapters in a Thinkpad SE are intended to allow two **different** Hardware Management Consoles to have independent paths to the SE.

   This is done so that the console can be controlled if one LAN goes down.

The following diagrams and paragraphs describe the 4 wiring scenarios:

- **Token Ring only wiring scenario**

  The “Token Ring only ”wiring scenario is the standard wiring approach used in previous generations of the IBM Enterprise Server Hardware Management Console and Support Element wiring. As in previous systems, each system includes a Multistation Access Unit (MAU) that may be used to interconnect the Token Ring adapter wiring of the Support Elements to the Hardware Management Console. Token Ring wiring may be used to interconnect the MAUs to form a larger private LAN where multiple systems are to be controlled by a single Hardware Management Console.

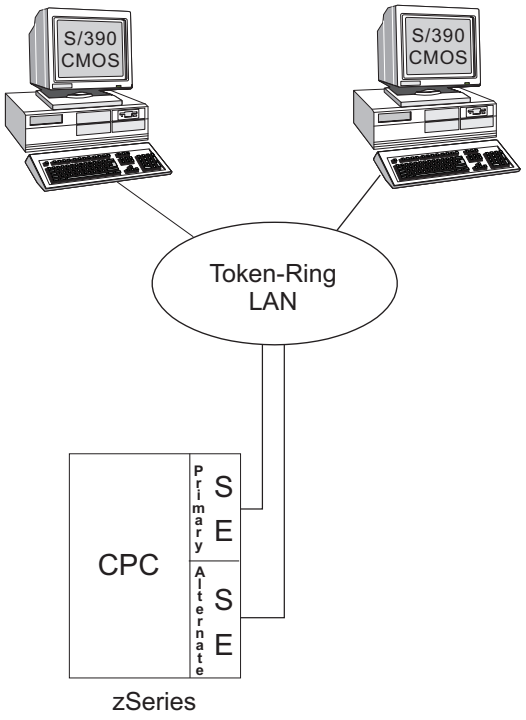

Figure 4-1. Token Ring only wiring scenario

- **Additional Token Ring only wiring scenario**

  Additional connections to the Token Ring LAN may be made to expand the connectivity beyond the local Hardware Management Console and Support Elements.

  If connections to previous generations of Enterprise Server systems are desired, they may be connected using the MAU in the system or they may be connected using Token Ring-to-Token Ring bridges.

  If connection to the enterprise LAN is desired, it is recommended that a Token Ring bridge be installed to isolate the Hardware Management Console and Support Elements from other systems.

  If connection to a central site focal point is desired, a local control unit can be attached to the LAN.

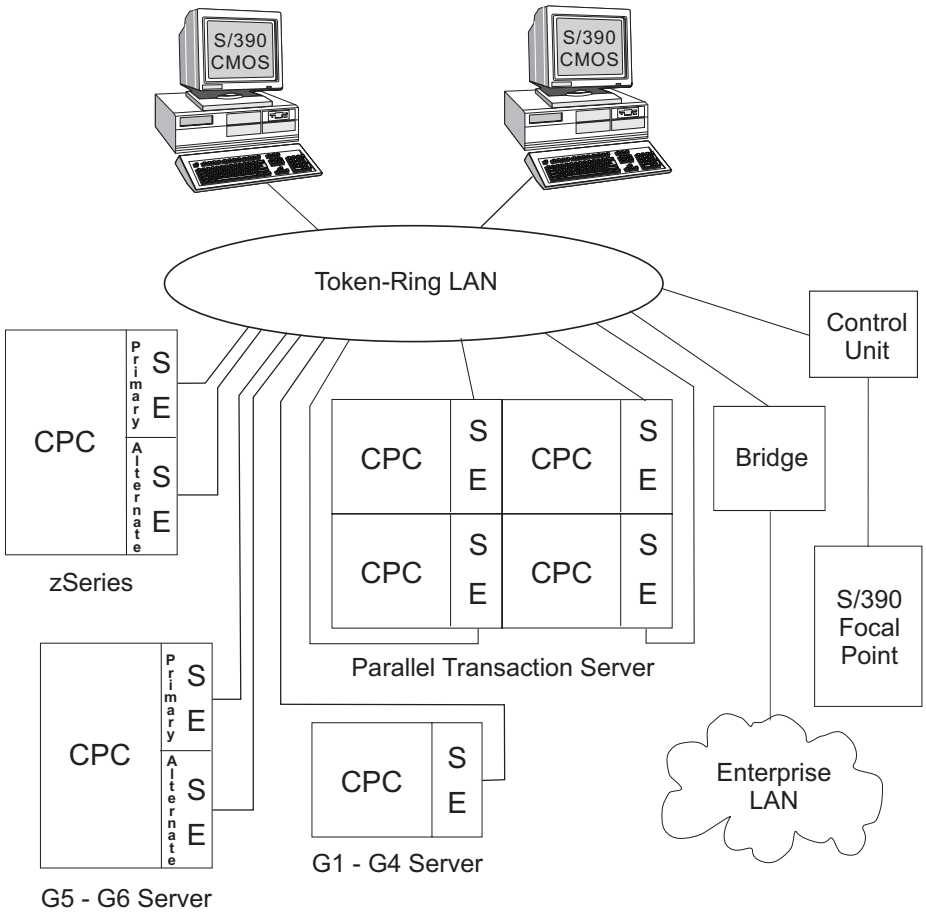

Figure 4-2. Token Ring only wiring scenario with additional connections.

- **Ethernet only - one path wiring scenario**

  This “Ethernet only” wiring scenario is intended for enterprises who currently have Ethernet installed and who do not want Token Ring wiring introduced into their environment. This wiring scenario requires that a second Ethernet be specified with the Support Elements and that no Token Ring feature be ordered on the Hardware Management Console, such that no Token Ring exists in either the Support Elements or in the Hardware Management Console. The Ethernet features assume the use of 10/100 Mbit Ethernet facilities, requiring the use of CAT-5 Ethernet cabling.

  Since the Support Element Ethernet only feature includes two Ethernet adapters, there will be two Ethernet connections available. For this scenario, only the Ethernet cable connected to the Ethernet in the first (top) PCMCIA slot of the Support Elements will be used.

  The three communication protocols (SNA, TCP/IP and NetBios) used in Support Element to Hardware Management Console communication are defined for both adapters in the PCMCIA slots of the Support Elements.

  It will be necessary to connect the “top” Ethernet adapter cable to a customer supplied local hub capable of 10/100 Mbit Ethernet rates. It will be necessary to connect the Ethernet from the Hardware Management Console to either the same hub as the Support Elements, or to a hub that connects to the Support Element hub.

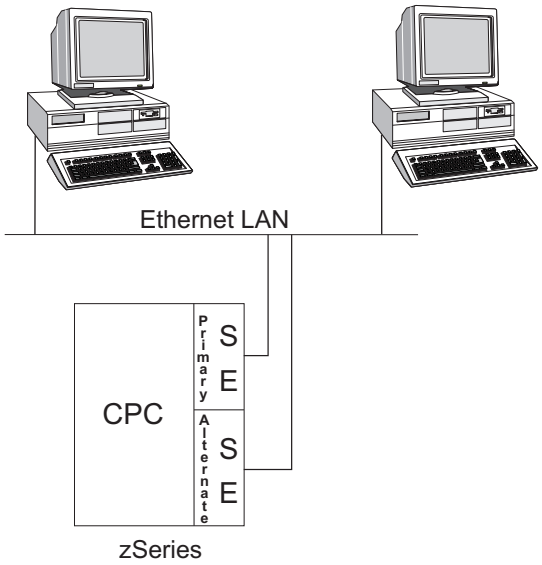

Figure 4-3. Ethernet only - one path wiring scenario

- **Additional connections to the Ethernet LAN** may be made to expand the connectivity beyond the local Hardware Management Console and Support Element.

  If connections to previous generations of IBM Enterprise Server systems are desired, they may be connected using Ethernet-to-Token Ring bridges.

  If connection to the enterprise LAN is desired, it is recommended that an Ethernet bridge or router be installed to isolate the Hardware Management Console and Support Element from other systems.

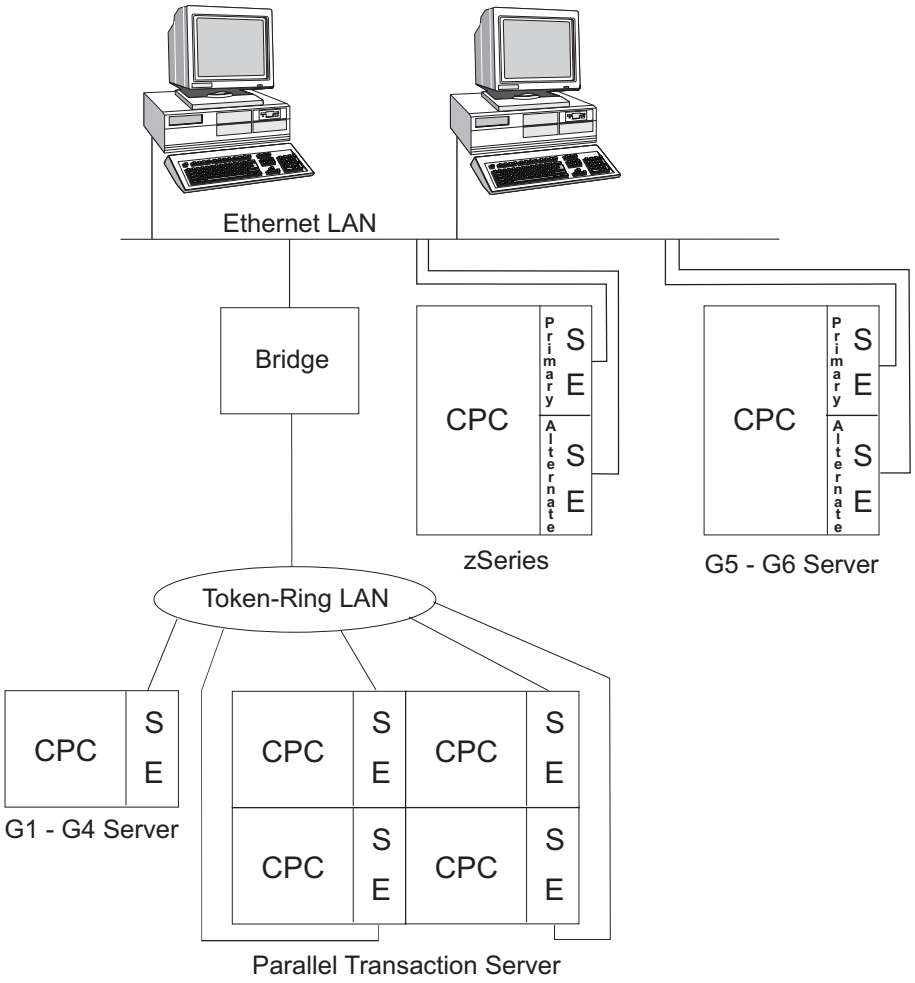

Figure 4-4. Ethernet only - one path wiring scenario with additional connections

- **Ethernet only - two path wiring scenario**

  This “Ethernet only” wiring scenario is also intended for enterprises who currently have Ethernet wiring and do not want Token Ring wiring introduced into their environment. The two path scenario is included to provide the possibility of a second, separate and redundant path to the Support Elements.

  This wiring scenario requires that FC 0087 (a second Ethernet) be specified with the Support Elements and that the Token Ring feature not be ordered with the Hardware Management Console such that no Token Ring exists in either the Support Elements or in the Hardware Management Console. The Ethernet features assume the use of 10/100 Mbit Ethernet facilities, requiring the use of CAT-5 Ethernet cabling. Since the Support Element Ethernet only feature includes two Ethernet adapters, there will be two Ethernet connections available. For this scenario, both the Ethernet cables will be used.

  The three communication protocols (SNA, TCP/IP and NetBios) used in Support Element to Hardware Management Console communication are defined for both adapters in the PCMCIA slots of the Support Elements.

  It will be necessary to connect the “top” Ethernet adapter cable to a customer supplied local hub capable of 10/100 Mbit Ethernet rates. It will be necessary to connect the Ethernet from at least one local Hardware Management Console to the same hub as the Support Elements.

  It will be necessary to connect the “bottom” Ethernet adapter cable to a customer supplied local hub capable of 10/100 Mbit Ethernet rates. This second adapter will have to be assigned an address on a separate subnet from the first adapter. Any Hardware Management Consoles attached to either LAN will be able to automatically discover the Support Elements, assuming that the LAN network allows NetBios to flow between the devices.

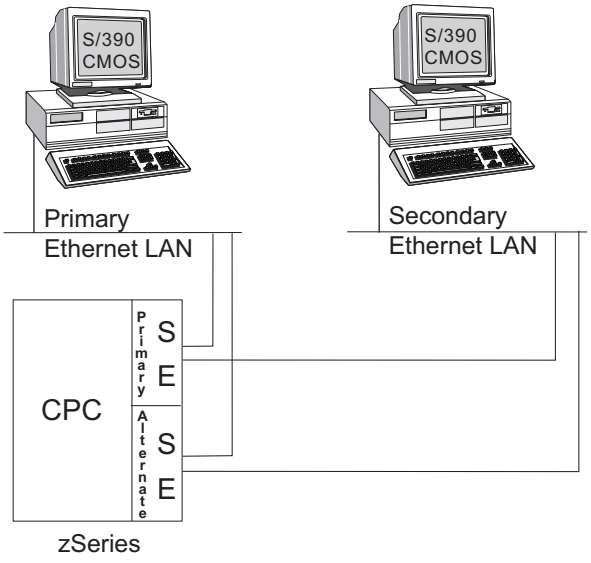

Figure 4-5. Ethernet only - two path wiring scenario

- **Additional connections to the Ethernet LAN** may be made to expand the connectivity beyond the local Hardware Management Console and Support Elements.

  If connections to previous generations of Enterprise Server systems are desired, they may be connected using Ethernet-to-Token Ring bridges.

  If connection to the enterprise LAN is desired, it is recommended that an Ethernet bridge or router be installed to isolate the Hardware Management Console and Support Elements from other systems.

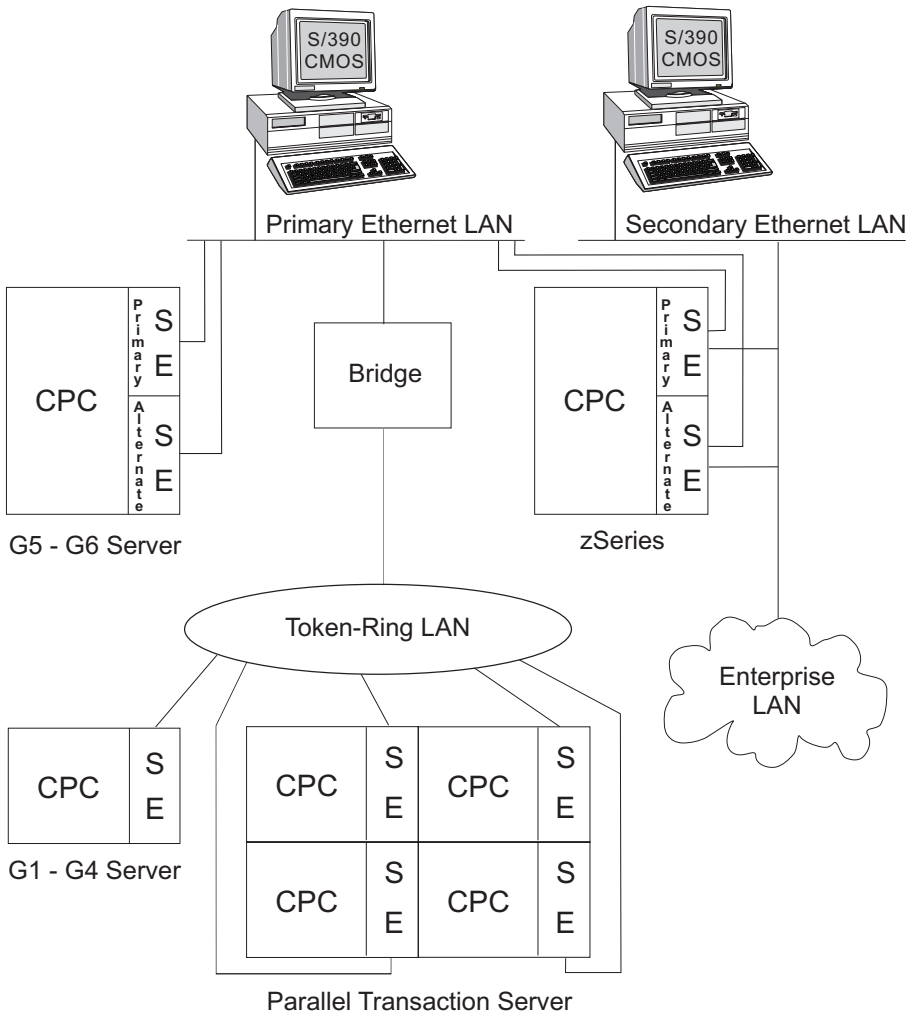

Figure 4-6. Ethernet only - two path wiring scenario with additional connections.

- **Token Ring and Ethernet wiring scenario**

  The “Token Ring and Ethernet” wiring scenario is intended for enterprises that have both Token Ring wiring and Ethernet wiring requirements. This scenario is included to provide the possibility of controlling the Support Elements from both a Token Ring Hardware Management Console and an Ethernet Hardware Management Console at the same time.

  This wiring scenario is supported by the default set of adapters available with the Support Elements and the optional Token Ring adapter on the Hardware Management Console. The Token Ring adapter assumes the use of a 16 Mbit Token Ring facility. The Ethernet features assume the use of 10/100 Mbit Ethernet facilities, requiring the use of CAT-5 Ethernet cabling.

  For this scenario, the three communication protocols (SNA, TCP/IP and NetBios) used in Support Element-to-Hardware Management Console communication are defined for both the Token Ring and the Ethernet adapters of the Support Elements. The Token Ring wiring is connected using the MAU as described above on page 4-3. The Ethernet wiring is connected from the Support Elements to a customer supplied local hub capable of10/100 Mbit Ethernet rates.

  The Hardware Management Consoles attached to either LAN will be able to automatically discover the Support Elements, assuming that the LAN network allows NetBios to flow between the devices. The Ethernet adapter will have to be assigned an address on a separate subnet from the Token Ring adapter.

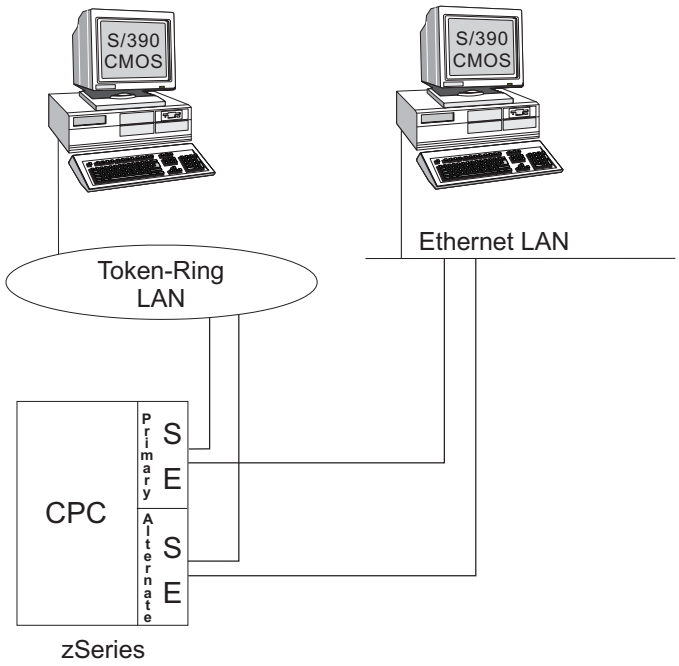

Figure 4-7. Token Ring and Ethernet wiring scenario

- **Additional connections to the Token Ring LAN** may be made to expand the connectivity beyond the local Hardware Management Console and Support Elements. This would be done as in the “Token Ring only” case on page 4-5

  Additional connections to the Ethernet LAN may be made to expand the connectivity beyond the local Hardware Management Console and Support Elements. This would be done as in the “Ethernet only” case on page 4-7

  If connections to previous generations of IBM Enterprise Server systems are desired, they may be connected using the Token Ring LAN.

  If connection to the enterprise LAN is desired, it is recommended that an Ethernet bridge or router be installed to isolate the Hardware Management Console and Support Elements from other systems.

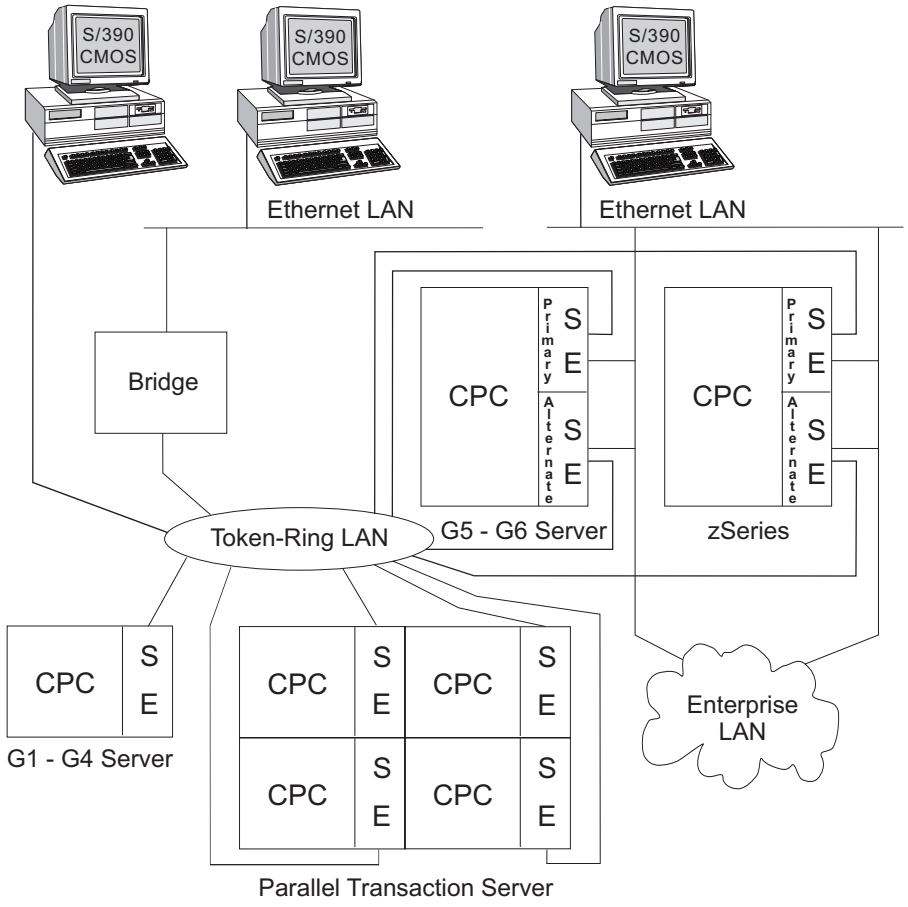

Figure 4-8. Token Ring and Ethernet wiring scenario with additional connections.

Trusted Key Entry (TKE)

zSeries 800s may have a cryptographic coprocessor feature for applications where extensive data security is required. For these systems, there is a separate console available for authorized access to the cryptographic feature. This console is named the Trusted Key Entry (TKE) PC.

The TKE workstation includes a system unit, mouse, keyboard, monitor, and line cord. A DVD is available for installation of Licensed Internal Code.

Note: zSeries 890 and 990 are the last zSeries servers that will support Token Ring LAN connection to the TKE workstation.

TKE workstation LAN adapter feature codes depend on the version of the TKE microcode.

Table 4-1.

TKE Microcode Level	Token Ring Feature Code	Ethernet Feature Code
3.0	0866	0869
3.1	0876	0879
4.0	0886	0889
4.1	0896	0899

Notes:

1. Older levels of LAN connection Feature Codes can be carried forward on system upgrades.
2. FC 0886 and FC 0889 are only orderable with zSeries 990.
3. zSeries 990 and zSeries 890 require TKE microcode levels at either 4.0 or 4.1.

The Token Ring adapter supports a link data rate of 4 or 16 Mbps. Ethernet on the system unit motherboard supports a link data rate of 10, 100, or 1000 Mbps. The Ethernet adapter supports a link data rate of 10 or 100 Mbps.

The TKE workstation attaches to the customer LAN, providing a security-rich, flexible method of providing master key and operational key entry to locally and remotely managed Cryptographic Coprocessor features.

Customers with TKE 3.x installed workstations may carry them forward to control legacy systems only.

To use the TKE function on zSeries 800, the CMOS Cryptographic Coprocessor Facility(CCF) feature must be enabled and the PCICC feature (FC 0861) must be installed. An update from TKE 3.0 or TKE 3.1 microcode level to TKE 4.0 or TKE 4.1 microcode level is required for use with the zSeries 890.

The TKE PC requires two 110/120 volt outlets in the U.S. and Canada. Power requirements vary in other countries.

LAN Connections

LAN cabling is a customer responsibility.

To connect the TKE workstation with Token Ring to a LAN, use either

- Unshield Twisted Pair (UTP) cable terminated with an RJ-45 connector

OR

- Shielded Twisted Pair (STP) cable terminated with a DB9 D Shell connector.

To connect the TKE workstation with Ethernet to a LAN, a Category 5 Unshielded Twisted Pair (UTP) cable terminated with an RJ-45 connector is required.

Sysplex Timer®

The Sysplex Timer synchronizes each system's time-of-day clock with the other system's clocks in multiple system installations. Each zSeries 800 system comes with two integrated timer cards, which allow connection of two Sysplex Timers for continuous availability. The cable connection at the zSeries 800 is ESCON Duplex, and matches the cable connection at the Sysplex Timer.

Chapter 5. Remote Support Facility Installation Planning

This section describes the telephone line and modem requirements for the Hardware Management Console Remote Support Facility (RSF). The Remote Support Facility provides communication to a centralized IBM support network for problem reporting and service, as well as providing a means for remote operation of the Hardware Management Console.

It is the customer's responsibility to arrange for installation and all costs of common-carrier equipment.

Ordering Telecommunication Service

Each Hardware Management Console (HMC) comes with a modem. One telephone line is required for **each** modem installed.

When ordering telecommunications service, be prepared to identify the following:

- The type of telephone jack required (country dependent)
- The long distance carrier
- The selection of either dual-tone multi-frequency (DTMF) or rotary (pulse) to be installed
- Installer of the telephone wiring and jack

The telephone line must be a dial-up (public switched network) analog type* with 24-hour, 7-day-a-week availability.

Note: *Digital telephone lines must not be used.

Modems

All models require a modem for RSF. An IBM 7852-400 or equivalent is supplied In the U.S. and Canada. EMEA, AP, and LA countries, will require an IBM 7852, IBM 7858 or equivalent. The specifications[1] of the IBM 7852-400 Modem are as follows:

- FCC registration number FVZUSA-21751-MM-E
- 28,800 bps line speed
- Tone or pulse dialing
- Standard CCITT V.24 or EIA-232-D interface cable to the data terminal equipment (DTE): 3 m (10 ft.)
- Country Dependent Telecommunication cable: 4.6 m (15 ft.)[2]
- Country Dependent Line Cord: 1.8 m (6 ft.)[2]
- Power Requirements: 115 V single-phase 60 Hz (0.3amp) or 240 V/50 Hz
- Heat Output: 11 W
- Operating Temperature Requirements: 0-50 °C (32-120 °F)
- Operating Relative Humidity: 8-80% (no condensation)
- Weight: 1.18 kg (2.6 lb) with power transformer
- Size:
  - Width: 156 mm (6.15 in)
  - Length: 229 mm (9 in)
  - Height: 35 mm (1.375 in)

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Notes:

1. For more detailed information about the IBM 7852-400 Modem see the*IBM 7852 Modem Model 400 External Data/Fax Modem Technical Reference*, 76H2773, or the *IBM 7852 Modem Model 400 External Data/Fax Modem Installation Guide*, 76H2772.
2. Telecommunication cable plugs and power cord plugs will vary depending on country code used when ordering (see Sales Manual for details)

Important

In countries where the IBM Hardware Management Console modem is not approved by the national communication authority a modem is needed which is in accordance with CCITT standard V.26bis. For non-IBM modems a 7852 equivalent, country approved modem is required that meets the following specifications:

- Line speed - 9600 bps or greater
- Command set - CCITT V.25 Bis for Synchronous, AT command set for Asynchronous
- Mode - Synchronous or Asynchronous
- Connection - Switch public network

It is the responsibility of the country to approve a local modem in these cases using local procedures.

Chapter 6. Cabling and Connectivity

Cable Installation Planning

Before you place your cable order, consider your future growth needs. You may wish to order cables longer than you need right now to avoid expansion problems in the future.

As processor packaging evolves, internal locations for various cable connections may shift, necessitating longer cables, even though the floor locations of connected devices have not changed.

The zSeries 800 family recognizes industry trends toward the use of standardized channel cable connectors. The same types of fiber optic connectors used in local area and storage area networks are also used to connect channel features in the zSeries 800.

Following are:

- A description of the new zSeries Fiber Optic Cabling Service and a list of customer responsibilities if you elect not to use the service
- A chart showing the various fiber optic cable connectors
- An illustration showing how to correctly route fiber optic cables to provide proper cable strain relief and ensure design performance.
- Descriptions of the channel features for the zSeries 800 system, including the Fiber Quick Connect trunking system for ESCON cables.

  Note: The Fiber Quick Connect trunking system cannot be used in a non-raised floor installation. There is not enough space to obtain correct cable bend radius at the tailgate exit area.

zSeries Fiber Cabling Service

The connectivity environment has become much more complex, and proper planning and installation of fiber cabling is critical to maximize the benefits of high speed protocols such as FICON, Fibre Channel Protocol, Coupling Facility links and Gigabit Ethernet. These protocols require planning for different fiber types, new fiber optic connectors, and current and future data rates to determine optimal connectivity and cabling options.

IBM Global Services provides a fixed-price services offering that includes planning and consulting with you about your cabling choices, and ordering, labeling, and installing the correct cables for your system. IBM Network Integration and Deployment Services for zSeries fiber cabling provides the right level of services and products needed to quickly and efficiently integrate your zSeries 800 system into the IT infrastructure and minimize installation costs.

Features of the offering include:

- Configuration services to effectively plan the fiber optic cabling needed.
- Consulting to design a scalable, flexible solution that supports the new system configuration.
- Procurement of fiber optic cables and components that are reliable and meet IBM physical specifications.

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- Installation services, including physical routing and labeling, to integrate the cabling system into the customer's infrastructure.
- Documenting the fiber optic cable installed.

External I/O cables and cable routing are a customer responsibility.

If you elect not to use the zSeries Fiber Cabling Service offered by IBM, then you will be responsible for performing the following tasks **prior** to system installation.

1. All cable planning and support
2. All purchasing of correct qualified cables
3. All installation of any required mode conditioners
4. All installation of any required conversion cables
5. All installation of any required jumper cables
6. All routing of cables to correct front/back cable tailgates for proper installation to the machine
7. All labeling of cables with CHPID numbers for proper installation to the machine.

Failure to accomplish these cabling tasks properly could lead to additional service charges during the machine installation in order to correct any problems incurred.

If you are planning a non-raised floor installation, it is imperative that you protect fiber optic cabling from damage. Proper strain relief and routing of fiber optic cable is essential to achieve advertised cable performance.

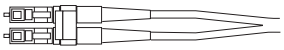
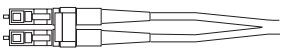
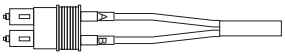
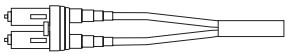
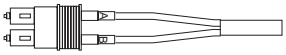
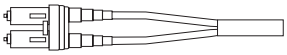
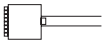
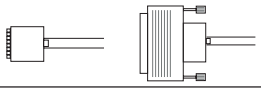
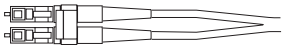
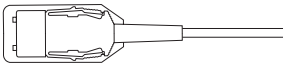
I/O Card Feature Code	I/O Card Description	Port Type	Illustration of Jumper Cable Connector
2323	15/16 port ESCON	Multimode MT-RJ (62.5 micron)	
2319	2 port FICON Express LX	Single Mode LC Duplex (9 micron)	
2320	2 port FICON Express SX	Multimode LC Duplex (50 and 62.5 micron)	
2362	2 port OSA Express ATM SM	Single Mode SC Duplex (9 micron)	
2363	2 port OSA Express ATM MM	Multimode SC Duplex (50 and 62.5 micron)	
2364	2 port OSA Express GbE LX	Single Mode SC Duplex (9 micron)	
2365	2 port OSA Express GbE SX	Multimode SC Duplex (50 and 62.5 micron)	
2366	2 port OSA Express Fast Ethernet	RJ-45	
2367	2 port OSA Express Token Ring	RJ-45, DB-9	
0218	4 port ISC-3	Single Mode LC Duplex (9 micron)	
	1 port External Time Reference	Multimode ESCON Duplex (62.5 micron)	

Figure 6-1. Summary of Channel Jumper Cable Connector Types

This illustration provides a brief description and shows the connectors for each type of I/O channel jumper cable used on the zSeries 800 system.

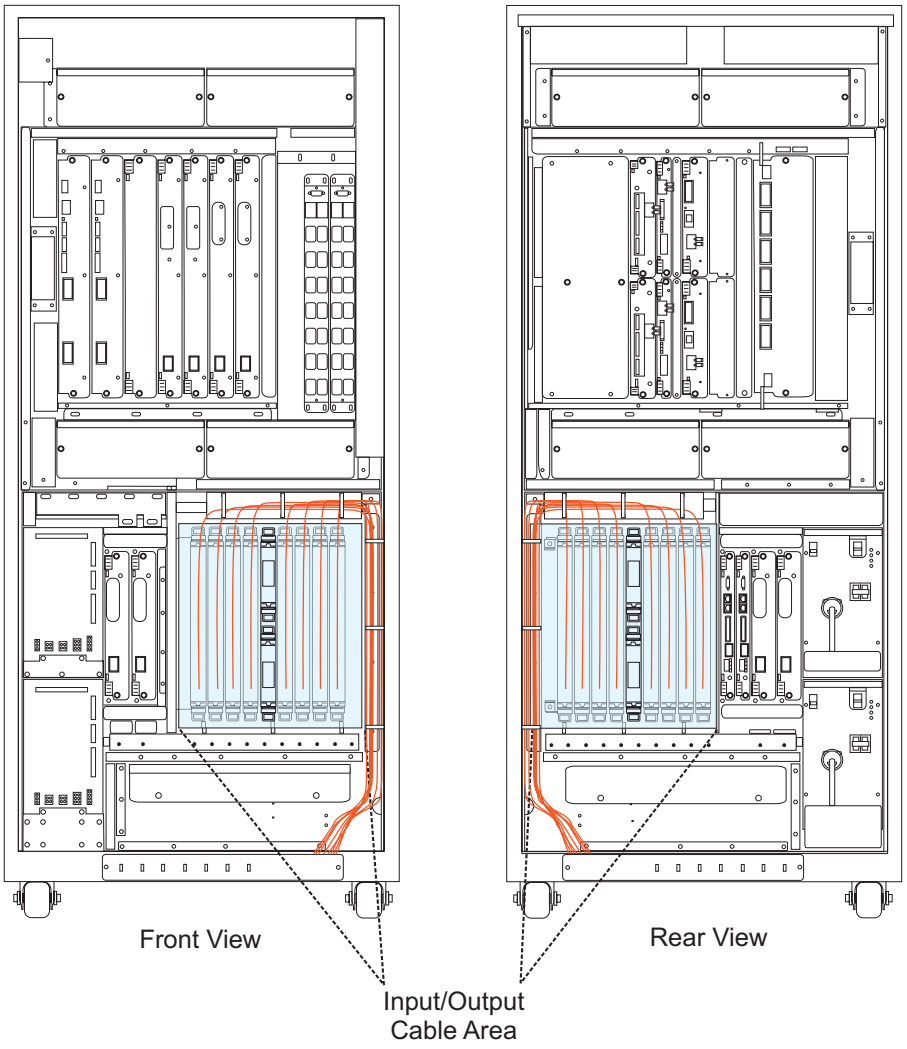


Figure 6-2. Fiber Optic Cable Routing

This illustration shows that the I/O cables route upward out of the I/O cage, across the top of the cage, down through three cable guides, and out through the tailgate.

FICON Channel Feature

The FICON channel delivers a 1 or 2 Gbps link data rate to servers, switches, control units and storage devices. The link speed is auto-negotiated, point-to-point, between server and device and is transparent to users and applications. FICON channels offer fast, efficient data transfer while allowing reuse of currently installed single mode and multimode fiber optic cables. FICON channels can coexist with ESCON channels on all zSeries 800 server models.

Configuration Information

The table below lists the FICON channel cards. Both FC 2319 and FC 2320 support 3 three modes of operation:

- FC - native FICON
- FCV - Fibre Channel Converter - used with the 9032 Model 5 Director with bridge card

  Note: The FICON Express LX feature is limited to 1Gpbs.
- FCP - Fibre Channel Protocol - attachment to SCSI disks in Linux environments.

Feature Code	Description	Fiber Type	Connector Type
FC 2319	FICON Express LX (Long Wavelength)	single mode 9 micron	LC Duplex
FC 2320	FICON Express SX (Short Wavelength)	multimode 50 and 62.5 micron	LC Duplex

FICON channel adapters have two ports per adapter card. Both short wavelength and long wavelength features can coexist in the same I/O cage.

Connectivity Information

FICON Express LX (Long Wavelength)
- Cable type is single mode 9 micron fiber optic
- Cable connector is LC duplex
- See “FICON References” for information about link distances and light loss budget.

FICON Express SX (Short Wavelength)
- Cable type is multimode 50 and 62.5 micron fiber optic
- Cable connector is LC duplex
- See “FICON References” for information about link distances and light loss budget.

FICON References

The following illustration shows the FICON channel card, the channel ports on the card, and the type of fiber optic connector that plugs to the channel ports.

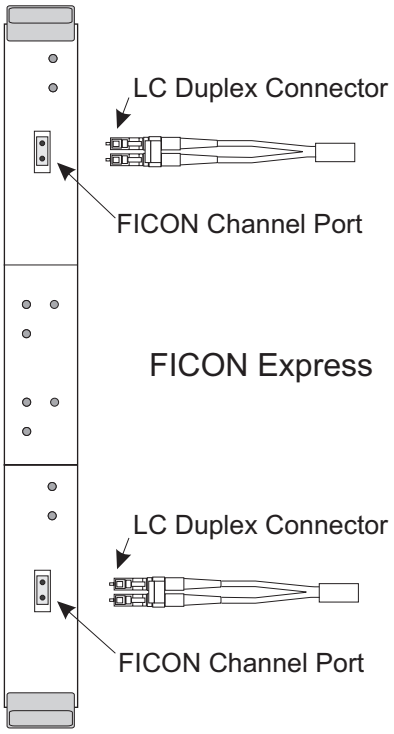


Figure 6-3. FICON Card

For additional information on planning for FICON channels see:

- *Introduction to IBM S/390 FICON*, SG24-5176
- *IBM S/390 FICON Migration Guide*, SG24-5169 and
- *Planning for: S/390® Fiber Optic Links (ESCON®, FICON™, and Coupling Links)*, GA23-0367
- *FICON Physical I/O Interface*, SA24-7172

Ordering FICON Fiber Optic Cables

Fiber optic cables for the zSeries 800 system may be ordered using the zSeries Fiber Cabling Service offered by IBM Global Services. This Service delivers a convenient, packaged solution to reduce the complexity of planning, ordering, installing, and documenting fiber optic cables. Individual jumper cables, cable components, and connector options are also available through IBM Global Services. Contact your local IBM Installation Planning Representative, IBM zSeries 800 Product Specialist, or IBM Connectivity Services Specialist for details.

ESCON Channel Feature

The ESCON channel delivers up to 17 Mbps link data rate to servers, switches, control units and storage devices. ESCON channels can coexist with FICON on all zSeries 800 server models.

The zSeries 800 system uses the 16 port ESCON card. Fifteen of the ports are used on this card. The sixteenth port is reserved as a spare.

Configuration Information

The table below shows the ESCON channel card description

Feature Code	Description	Fiber Type	Connector Type
FC 2323	16-Port ESCON (15 ports plus 1 spare)	Multimode 62.5 micron	MT-RJ

- Use FC 2324 to order channels in 4-port increments. There can be a maximum of 60 FC 2324s per system, for a total of 240 ESCON channels, maximum.
- The system configuration tool places FC 2324s across an appropriate number of ESCON cards for high availability.

Connectivity Information

16 Port ESCON

- Cable type is multimode 62.5 micron fiber optic
- Cable connector is MT-RJ
- Existing ESCON multimode fiber can be reused with an MT-RJ to ESCON Duplex conversion kit. See Figure 6-9 on page 6-17
- See “ESCON References” for information about link distances and light loss budget.

ESCON References

The following illustration shows the ESCON channel card, the channel ports on the card, and the type of fiber optic connector that plugs to the channel ports.

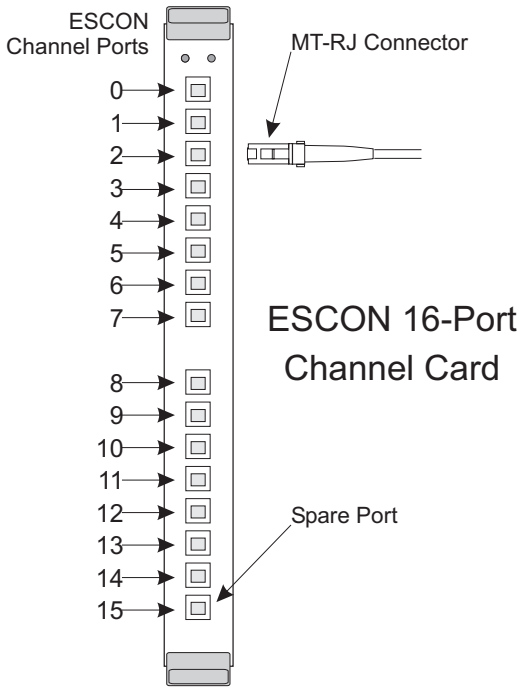


Figure 6-4. ESCON Card

For additional information on planning for ESCON channels see:

- *Fiber Optic Links Planning (ESCON, FICON, and Coupling Links)*, GA23-0367
- *ESCON Physical Layer*, SA23-0394
- *IBM Input/Output Equipment Installation Manual-Physical Planning*, GC22-7064

Ordering ESCON Fiber Optic Cables

Fiber optic cables for the zSeries 800 system may be ordered using the zSeries Fiber Cabling Service offered by IBM Global Services. This Service delivers a convenient, packaged solution to reduce the complexity of planning, ordering, installing, and documenting fiber optic cables. Individual jumper cables, cable components, and connector options are also available through IBM Global Services. Contact your local IBM Installation Planning Representative, IBM zSeries 800 Product Specialist, or IBM Connectivity Services Specialist for details.

ISC-3 Link Feature

ISC-3 links provide Parallel Sysplex connectivity between a coupling facility and production systems using z/OS® and OS/390® operating systems. ISC-3 links operate at 1 Gbps in compatibility mode (connection between zSeries 800 and 9672 systems) or 2 Gbps in peer mode (connection between zSeries 800 systems or zSeries 800 and zSeries 900, zSeries 890, or zSeries 990 systems) at unrepeated distances up to 10 kilometers.

Configuration Information

The table below lists the ISC-3 link feature code.

Feature Code	Description	Fiber Type	Connector Type
FC 0218	4-Port ISC-3	9 micron single mode	LC Duplex

- ISC-3 links are comprised of:
  - FC 0218 - A “daughter” adapter card with two ISC-3 ports per card.
  - FC 0217 - A “mother” card into which can be plugged two “daughter” cards.
  - FC 0219 - LIC that activates the ports on a daughter card. Each port on a daughter card is activated individually.
  - The “mother” card, two “daughter” cards, and the individual port LIC can combine to provide up to four ports per ISC-3 adapter.
- The system configuration tool places the ISC-3 feature port LIC across an appropriate number of cards for high availability.
- There can be a maximum of 24 ports activated across 8 ISC-3 features.

Connectivity Information

4-Port ISC-3

- Cable type is single mode 9 micron fiber optic
- Cable connector is LC duplex
- See *Fiber Optic Links Planning (ESCON, FICON, and Coupling Links)*, GA23-0367 for information about link distances and light loss budget.

ISC-3 Reference

The following illustration shows the ISC-3 link card, the link ports on the card, and the type of fiber optic connector that plugs to the ports.

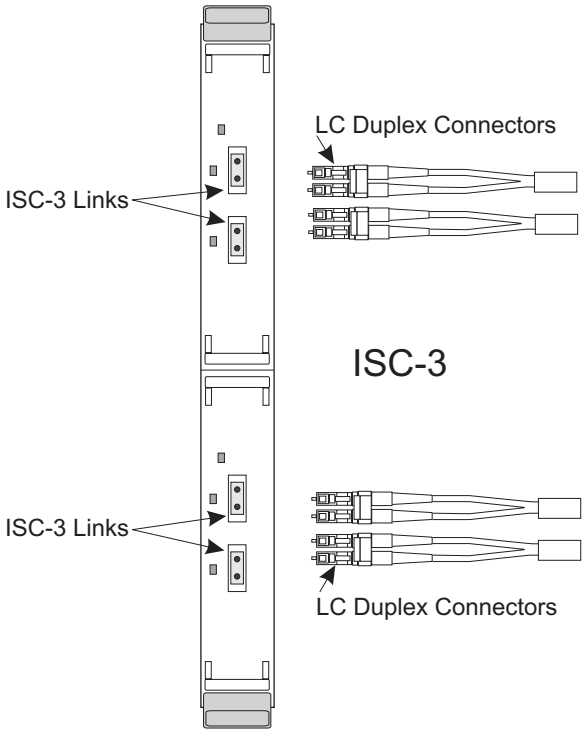


Figure 6-5. ISC-3 Card

Ordering ISC-3 Fiber Optic Links

Fiber optic cables for the zSeries 800 system may be ordered using the zSeries Fiber Cabling Service offered by IBM Global Services. This Service delivers a convenient, packaged solution to reduce the complexity of planning, ordering, installing, and documenting fiber optic cables. Individual jumper cables, cable components, and connector options are also available through IBM Global Services. Contact your local IBM Installation Planning Representative, IBM zSeries 800 Product Specialist, or IBM Connectivity Services Specialist for details.

OSA-Express LAN Connection Features

Open Systems Adapter-Express (OSA-Express) features enable connectivity to industry-standard local area networks (LANs). OSA-Express features (GbE, Fast Ethernet, Token Ring and 155 ATM) are all available with the zSeries 800 system.

Configuration Information

The table below lists the OSA-Express LAN features.

Table 6-1. OSA-Express Feature Codes

Feature Code	Description	Fiber Type	Connector Type
FC 2362	2-Port ATM SM	Single Mode (9 micron)	SC Duplex
FC 2363	2-Port ATM MM	Multimode (62.5 micron)	SC Duplex
FC 2364	2-Port LX Gigabit Ethernet	Single Mode (9 micron)	SC Duplex
FC 2365	2-Port SX Gigabit Ethernet	Multimode (50 and 62.5 micron)	SC Duplex
FC 2366	2-Port Fast Ethernet	Category 5 UTP copper	RJ-45
FC 2367	2-Port Token Ring	Category 5 UTP copper or 150 ohm STP copper (ISO/IEC 11801)	RJ-45, DB-9 D shell

OSA-Express cards each have two ports, and are ordered in 2-port increments. The maximum number of OSA-Express cards is 12 with any mix of features.

Connectivity Information

OSA-Express 155 ATM Single Mode

- Cable type is single mode 9 micron fiber optic
- Cable connector is SC duplex
- See *Fiber Optic Links Planning (ESCON, FICON, and Coupling Links)*, GA23-0367 for information about link distances and light loss budget.

OSA-Express 155 ATM Multimode

- Cable type is multimode 62.5 micron fiber optic
- Cable connector is SC duplex
- See *Fiber Optic Links Planning (ESCON, FICON, and Coupling Links)*, GA23-0367 for information about link distances and light loss budget.

OSA-Express Gigabit Ethernet (GbE) LX Single Mode

- Cable type is single mode 9 micron fiber optic
- Cable connector is SC duplex
- See *Fiber Optic Links Planning (ESCON, FICON, and Coupling Links)*, GA23-0367 for information about link distances and light loss budget.

OSA-Express Gigabit Ethernet (GbE) SX Multimode

- Cable type is multimode 50 and 62.5 micron fiber optic
- Cable connector is SC duplex
- See *Fiber Optic Links Planning (ESCON, FICON, and Coupling Links)*, GA23-0367 for information about link distances and light loss budget.

OSA-Express Fast Ethernet

- Cable type is copper wire:
  - Two pairs of Category 5 Unshielded twisted pair (UTP) cable, or
- Cable connector is RJ-45

OSA-Express High Speed Token Ring

- Cable type is copper wire:
  - Two pairs of Category 5 Unshielded twisted pair (UTP) cable, or
  - Two pairs of 150 ohm shielded twisted pair (STP) cable (ISO/IEC 11801 specification)
- Cable connector is RJ-45 or 9-pin DB-9.

OSA-Express Reference

The following illustration shows the OSA-Express LAN cards, the LAN ports on the cards, and the type of fiber optic or copper connectors that plug to the ports.

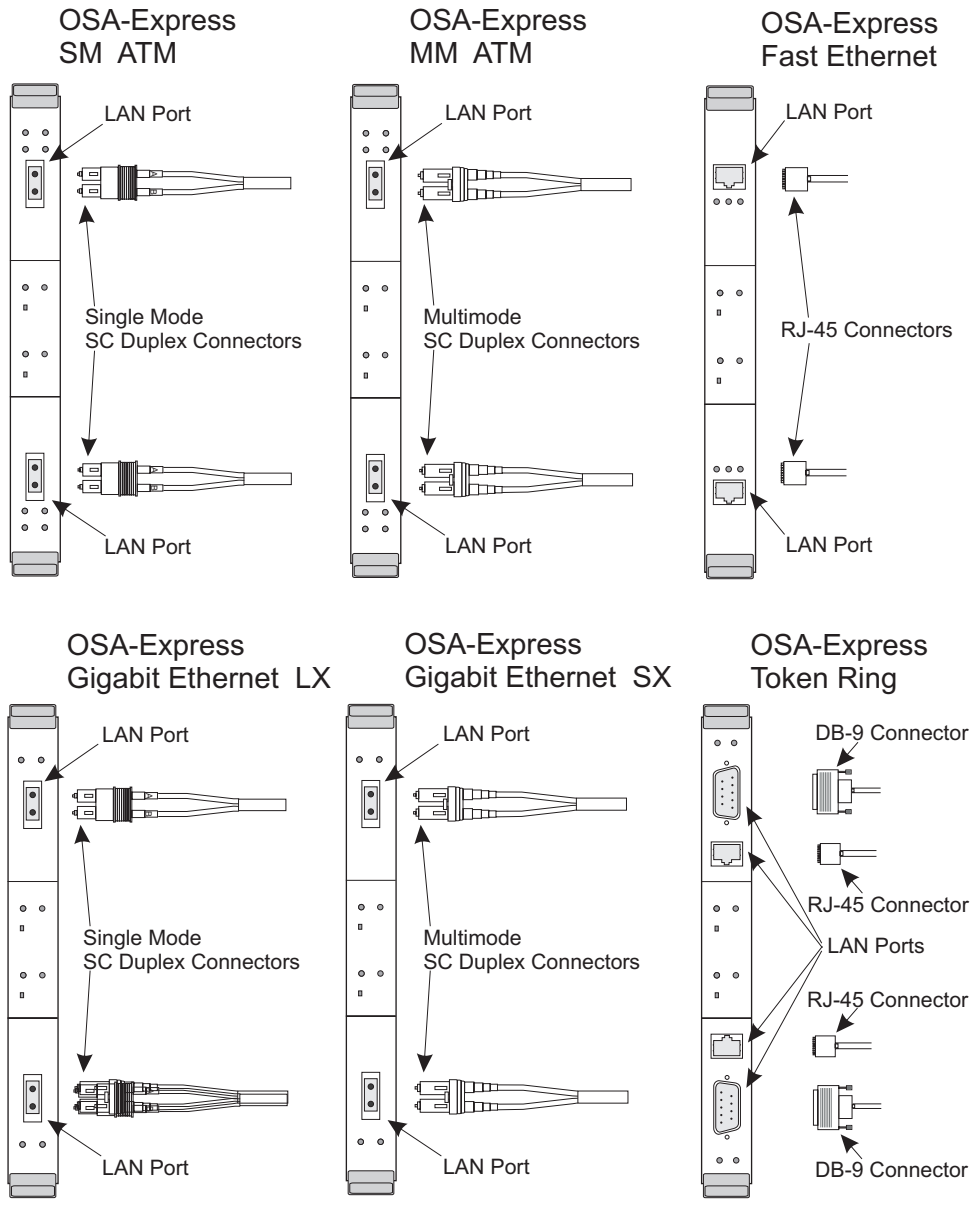


Figure 6-6. OSA-Express Cards

For additional information on planning for OSA-Express see:

- *OSA Express Customer's Guide and Reference*, SA22-7476 and
- *Planning for the Open System Adapter -2 Feature*, GA22-7477.

Ordering OSA-Express Cables

Fiber optic cables for the zSeries 800 system may be ordered using the zSeries Fiber Cabling Service offered by IBM Global Services. This Service delivers a convenient, packaged solution to reduce the complexity of planning, ordering, installing, and documenting fiber optic cables. Individual jumper cables, cable components, and connector options are also available through IBM Global Services. Contact your local IBM Installation Planning Representative, IBM zSeries 800 Product Specialist, or IBM Connectivity Services Specialist for details.

External Time Reference (ETR)

The External Time Reference function is part of the processor in the zSeries 800 system. There is an ESCON duplex port on each ETR card for the cable connection to a Sysplex Timer. Each ETR card should connect to a different Sysplex Timer in an Expanded Availability configuration.

Connectivity Information

- Cable is multimode 62.5 micron fiber optic
- Cable connector is ESCON Duplex
- See *Fiber Optic Links Planning (ESCON, FICON, and Coupling Links)*, GA23-0367 for information about link distances and light loss budget.

ETR Reference

The following illustration shows the ETR cards, the channel ports on the cards, and the type of fiber optic connector that plugs to the channel ports.

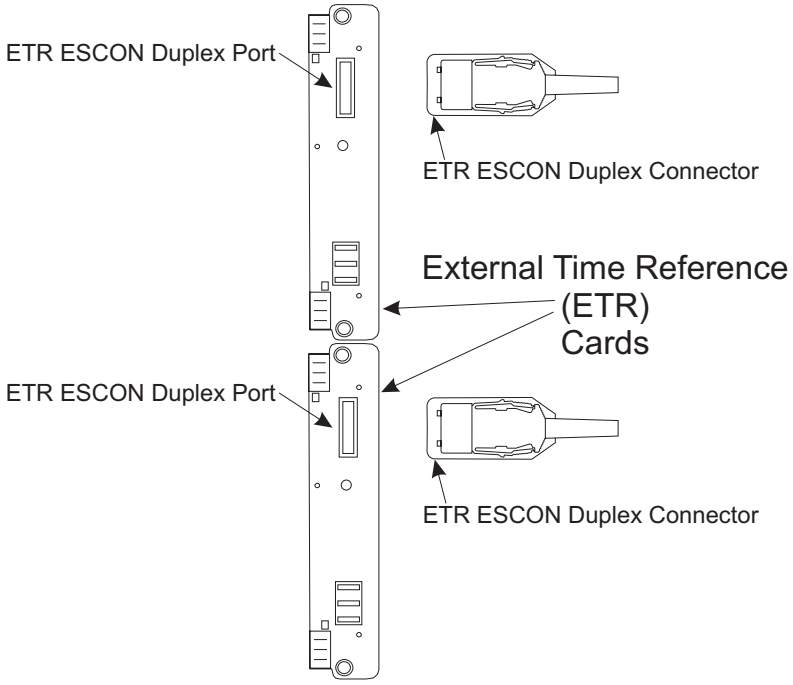


Figure 6-7. ETR Card

Ordering ETR Cables

Two ESCON Duplex cables for the ETR feature on the zSeries 800 system will automatically be added to any zSeries Fiber Cabling Service contract offered by IBM Global Services. Contact your local IBM Installation Planning Representative, IBM zSeries 800 Product Specialist, or IBM Connectivity Services Specialist for details. If you choose not to use this Service, you may purchase the two ESCON Duplex cables separately, or provide them yourself from another source.

Parallel Channels

Customers using parallel channel-attached devices must purchase a parallel channel converter box. This box converts ESCON channel signal inputs to parallel channel outputs. ESCON channel fiber optic cables are required from the zSeries 800 to the converter.

MCP Cables

The following table describes how mode conditioning patch cables (abbreviated in the table as MCP) are used.

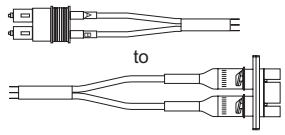
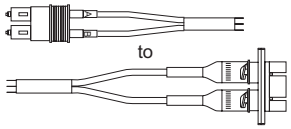
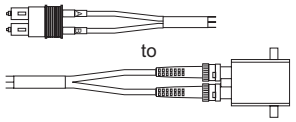
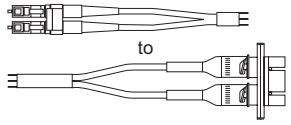
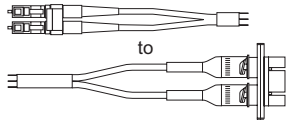
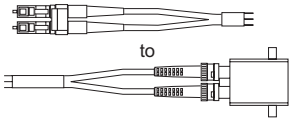
MCP Cable Part Number	MCP Cable Description	Description of MCP Cable Connector/ Cable Receptacle	Illustration of MCP Cable Connector/ Cable Receptacle
21L4172	9 micron Single Mode to 50 micron Multimode	SC Duplex Connector to SC Duplex Receptacle	
21L4173	9 micron Single Mode to 62.5 micron Multimode	SC Duplex Connector to SC Duplex Receptacle	
21L4175	9 micron Single Mode to 62.5 micron Multimode	SC Duplex Connector to ESCON Duplex Receptacle	
05N6771	9 micron Single Mode to 50 micron Multimode	LC Duplex Connector to SC Duplex Receptacle	
11P4658	9 micron Single Mode to 62.5 micron Multimode	LC Duplex Connector to SC Duplex Receptacle	
11P4150	9 micron Single Mode to 62.5 micron Multimode	LC Duplex Connector to ESCON Duplex Receptacle	

Figure 6-8. Summary of Mode Conditioning Patch Cable Usage

- MCP cables are 2 m (6.5 ft) long
- MCP cables have a link loss budget of 5.0 dB
- MCP cables are always used in pairs, as described in the following manner:
  - Target device with an LX transceiver, connected to an
  - MCP cable, connected to an
  - existing 50 or 62.5 micron fiber optic cable, connected to an

– MCP cable, connected to a
– Target device with an LX transceiver

MCP Cables and Gigabit Links

IBM supports the use of Mode Conditioning Patch (MCP) cables with the following coupling links:

- ISC-3 (in 1 gigabit compatibility mode)
- HiPerLinks (ISC-2)
- OSA-Express Gigabit Ethernet LX
- FICON LX
- FICON Express LX

These links all have a long wavelength optical transceiver designed to be used with 9 micron single mode fiber optic cables. MCP cables accommodate the reuse of existing 50 and 62.5 micron multimode links with the features listed above.

MCP cables are only used on 1 Gbps links. Under this condition, ISC-3 features can only use MCP cabling to operate in compatibility mode with ISC-2 features on Parallel Enterprise Servers Generations 3 through 6.

As technology evolves, speeds will increase to two and four Gbps. MCP cables will not be supported beyond the one Gbps rate.

Conversion Kit Cables

The following table describes how conversion kit cables are used.

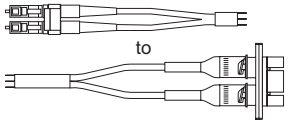
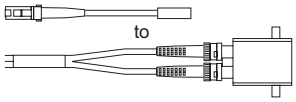
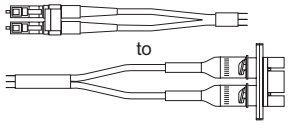
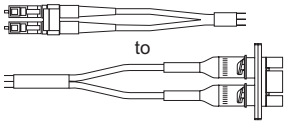
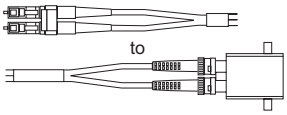
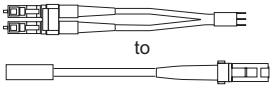
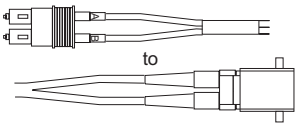
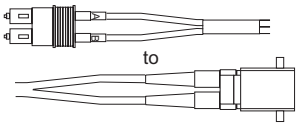
Conversion Kit Cable Part Number	Conversion Kit Cable Description	Description of Conversion Kit Cable Connector/ Cable Connector	Illustration of Conversion Kit Cable Connector/ Cable Receptacle
05N4808	9 micron Single Mode	LC Duplex to SC Duplex	
05N4804	62.5 micron Multimode	MTRJ to ESCON Duplex	
11P1373	50 micron Multimode	LC Duplex to SC Duplex	
11P1374	62.5 micron Multimode	LC Duplex to SC Duplex	
11P2979	62.5 micron Multimode	LC Duplex to ESCON Duplex	
11P4417	62.5 micron Multimode	LC Duplex to MTRJ	
11P4418	62.5 micron Multimode	SC Duplex to LC Duplex	
11P4419	9 micron Single Mode	SC Duplex to LC Duplex	

Figure 6-9. Summary of Conversion Kit Cable Usage

Fiber Quick Connect ESCON Cabling

Note: The Fiber Quick Connect trunking system cannot be used in a non-raised floor installation. There is not enough space to obtain correct cable bend radius at the tailgate exit area.

Ordered in conjunction with a Fiber Transport Services direct-attach, trunk cabling solution, the Fiber Quick Connect feature enables trunk cables to connect to ESCON channels using under-the-cover attachment harnesses. These harnesses are installed when your system is built, and your zSeries 800 arrives ready to connect the trunk cables at your site.

This illustration shows that the Fiber Quick Connect feature allows the use of MT-RJ cables.

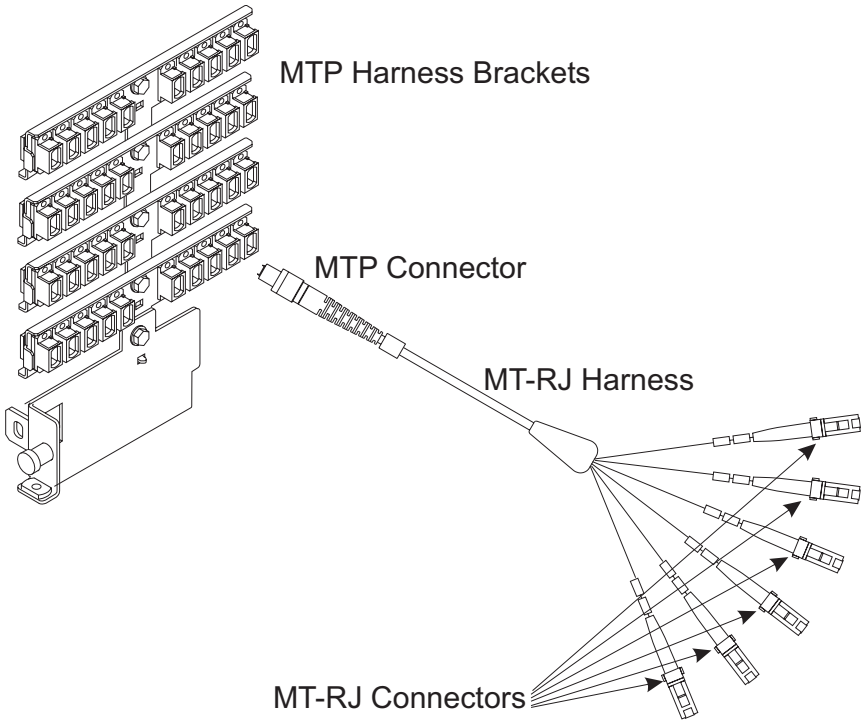


Figure 6-10. ESCON Harnesses and Harness Bracket

There can be from one to four rows of trunk connectors on the bracket. The trunk brackets use an MTP connector, and the ESCON connectors are routed to the ESCON feature cards in each frame.

If you are planning to use the Fiber Quick Connect feature for ESCON channels, contact Networking Services for assistance. Networking Services will help you plan for the trunk cabling solution that meets your individual system requirements. Your IBM installation planning representative, IBM product specialist, or IBM service representative will provide you with the information necessary to contact Connectivity Services.

Integrated Cluster Bus Channel

The integrated cluster bus (ICB) uses a Self-Timed Interconnect (STI) to perform coupling communication between systems. If you are planning to install integrated

cluster bus channels, you will have to place connected devices closer than 10 meters to allow for cable routing between equipment, including the distance under your raised floor and vertical routing to the physical cable connectors in the system frames.

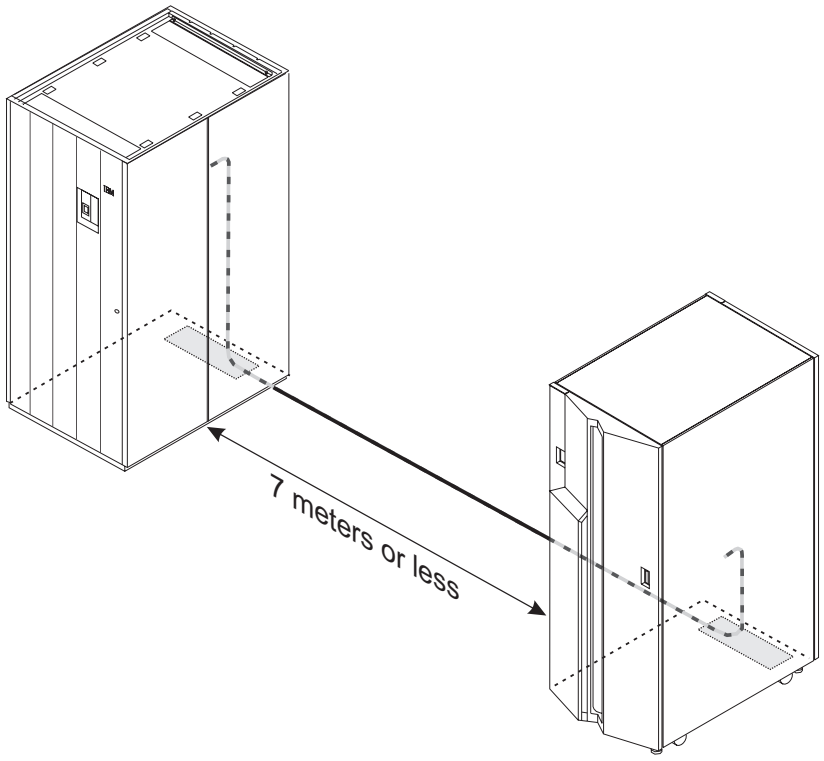
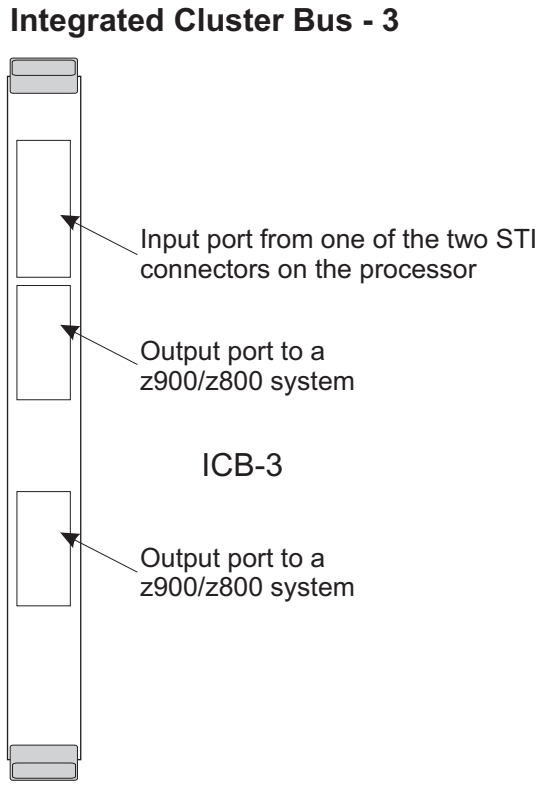


Figure 6-11. Integrated Cluster Bus Cabling

You must plan the floor placement of connected equipment carefully, subtracting the appropriate amount of cable length for your particular situation.

ICB-3 cables connect between two zSeries systems. Note that, for each pair of ICB features, you order only one ICB cable, (FC 0227).


Integrated Cluster Bus - 3
Input port from one of the two STI connectors on the processor
Output port to a z900/z800 system
ICB-3
Output port to a z900/z800 system

ICB cables are NOT supplied under the Fiber Cabling Service offering. They must be ordered, the same as other optional features.

Preparing Configuration Definition

The customer is responsible for preparing a definition of the I/O configuration for the new processor. You should use the CHPID report from the Configurator as a guide for planning and defining the new configuration. Depending on the current operating environment there may be several methods for accomplishing this.

z/VM®

If you use HCM and HCD, develop the configuration using HCM and HCD. Otherwise, develop the IOCP statements necessary to define your configuration and use the level of the ICP IOCP program that supports the new processor to verify the input statements. You do not need to initially assign PCHID values to the channel paths in your configuration. You can use the CHPID Mapping Tool, available from Resource Link, to aid you in assigning PCHIDs to CHPIDs. HCM and HCD users must build an IOCP input data set from a validated work IODF and use this as input to the CHPID Mapping Tool. The CHPID Mapping Tool updates the IOCP input and assigns PCHIDs to the CHPIDs.

Note: An IOCP input file that was created by HCM and HCD without PCHIDs must be migrated back into HCM and HCD after PCHID numbers have been added to the file by the CHPID Mapping Tool. An IOCDS can then be written from a production IODF or IOCP statements can be built for the install diskette.

If upgrading from a 2064 z900 model at EC J10638 or later, use the ″Write IOCDS in Preparation for an Upgrade″ option in HCD from a production IODF, or the

″NOCHKCPC″ execution parameter option in IOCP, and write your new IOCDS to the Support Element prior to the upgrade. This eliminates saving the IOCP source to a diskette and running Stand-alone IOCP during the install. Simply tell the install team which IOCDS (A0-A3) you have pre-written with the new configuration.

If you are installing a new processor, transfer the IOCP statements for your configuration to a diskette. If necessary, the IOCP input file can be compressed using a zip-compatible program. When the new system arrives, give the diskette containing the IOCP input statements to the install team.

If you are installing a new processor, instead of using a diskette you can remotely write the IOCDS from an HCD that is running on an installed CPC in the same HMC cluster. Inform the install team that plans are in place to use the ″Build and manage S/390 microprocessor IOCDSs″ option in HCD to write the IOCDS.

VSE/ESA™

Develop the IOCP statements necessary to define your configuration and use the level of the ICP IOCP program that supports the new processor to verify the input statements. You do not need to initially assign PCHID values to the channel paths in your configuration. You can use the CHPID Mapping Tool, available from Resource Link, to aid you in assigning PCHIDs to CHPIDs. The CHPID Mapping Tool updates the IOCP input and assigns PCHIDs to the CHPIDs.

If upgrading from a 2064 z900 model at EC J10638 or later, use the ″CHECKCPC=NO″ execution parameter option in IOCP, and write your new IOCDS to the Support Element prior to the upgrade. This eliminates saving the IOCP source to a diskette and running Stand-alone IOCP during the install. Simply tell the install team which IOCDS (A0-A3) you have pre-written with the new configuration.

If you are installing a new processor, transfer the IOCP statements for your configuration to a diskette. If necessary, the IOCP input file can be compressed using a zip-compatible program. When the new system arrives, give the diskette containing the IOCP input statements to the install team.

OS/390 and z/OS HCD

Develop the configuration using HCD. You do not need to initially assign PCHID values to the channel paths in your configuration. You can use the CHPID Mapping Tool, available from Resource Link, to aid you in assigning PCHIDs to CHPIDs. Build an IOCP input data set from a validated work IODF and use this as input to the CHPID Mapping Tool. The CHPID Mapping Tool updates the IOCP input and assigns PCHIDs to the CHPIDs. Migrate the modified IOCP input file back into HCD after PCHID numbers have been added to the file by the CHPID Mapping Tool. An IOCDS can then be written in preparation for an upgrade using a production IODF.

Note: An IOCP input file that was created by HCD without PCHIDs must be migrated back into HCD after PCHID numbers have been added to the file by the CHPID Mapping Tool. An IOCDS can then be written from a production IODF or IOCP statements can be built for the install diskette.

If upgrading from a 2064 z900 model at EC J10638 or later, use the ″Write IOCDS in Preparation for an Upgrade″ option in HCD from a production IODF and write your new IOCDS to the Support Element prior to the upgrade. This eliminates saving the IOCP source to a diskette and running Stand-alone IOCP during the install. Simply tell the install team which IOCDS (A0-A3) you have pre-written with the new configuration.

If you are installing a new processor, build an IOCP input data set for your configuration from a production IODF and transfer the IOCP statements to a diskette. In the unlikely event that the IOCP input file exceeds the capacity of the diskette, the IOCP input file can be compressed using a zip-compatible program. When the new system arrives, give the diskette containing the IOCP input statements to the install team.

If you are installing a new processor, instead of using a diskette you can remotely write the IOCDS from an HCD that is running on an installed CPC in the same HMC cluster. Inform the install team that plans are in place to use the ″Build and manage S/390 microprocessor IOCDSs″ option in HCD to write the IOCDS.

CHPID Numbers

The zSeries 800 system provides the capability to change the CHPID numbers assigned to channels by the order process configurator. The CHPID Assignment function is accessible only from Service (CE) Mode. If you want to reassign CHPID numbers when your system is installed, you must create a diskette with the new assignments to be imported into the CHPID Assignment function.

The CHPID Mapping Tool, available on IBM's Resource Link web site, is used to create the diskette. You can access Resource Link any time after your order is sent to manufacturing. Using your input and the machine order (CFReport), the Mapping Tool creates the diskette, customized for your specific configuration, and also creates a new CHPID Report.

Remember to use the CHPID report generated by the Mapping Tool (not the report created by the configurator) to create and/or verify your HCD/IOCP input, and for documenting your final CHPID assignments.

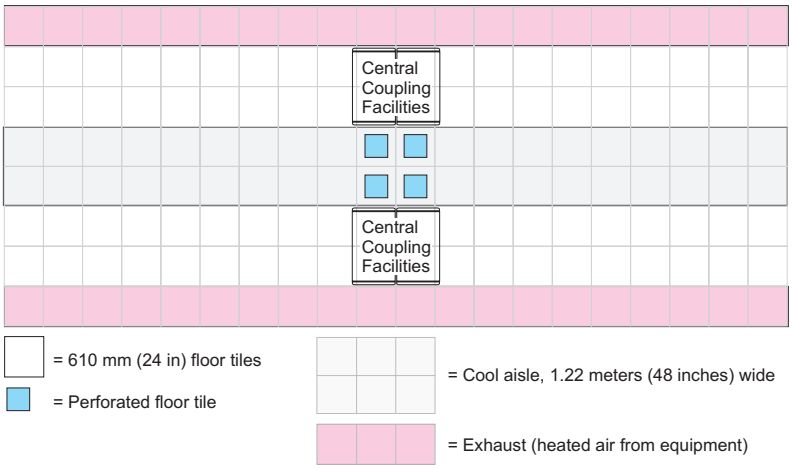
Chapter 7. Parallel Sysplex®

Parallel Sysplex Planning

This chapter is intended to provide guidance to those customers who operate in a Parallel Sysplex environment. A Parallel Sysplex typically involves multiple processors and coupling facilities, shared I/O devices, and a host of interconnection possibilities. Detailed planning for a Parallel Sysplex is essential to meet technical objectives, such as performance and high availability, within the constraints of a specific raised floor configuration. Consider using the zSeries Fiber Optic Cabling Service to plan your sysplex environment. A list of tasks the Service can perform is provided under “zSeries Fiber Cabling Service” on page 6-1 Different technologies for servers, links and coupling facilities affect your ability to configure a productive sysplex. Following are some guidelines to help you better plan for multiple system interconnection.

The basic premise for a successful Parallel Sysplex installation is to centralize the physical location of the coupling facilities, and then position the sysplex servers around that center.

1. Position the coupling facilities (or servers with internal coupling facilities) in the center of an open area of raised floor large enough to accommodate all of the servers and other coupling facilities to which you want to connect.


Central Coupling Facilities
Central Coupling Facilities
= 610 mm (24 in) floor tiles
= Perforated floor tile
= Cool aisle, 1.22 meters (48 inches) wide
= Exhaust (heated air from equipment)

   - Use physical planning information for each type of server/coupling facility you intend to add to the Parallel Sysplex to help determine how much floor space you will need.
   - Remember to consider weight distribution, service clearances, power, and cooling for each piece of equipment you want to include.
2. Arrange the sysplex in two rows, with the fronts of servers and coupling facilities facing each other (see the illustration under “Considerations for Multiple System Installations” on page 2-9). Allow a 1.22 meter (48 inch) aisle width between the rows. Although this may be a larger aisle than you have used before, your Parallel Sysplex will benefit from the improvement in cooling that a wider aisle provides (see the illustration under “Considerations for Multiple System Installations” on page 2-9).

   Note: The system air flow illustration shows a minimum aisle width of 941 mm (37 in). Although this width is adequate for a congested computer room floor, it is the **minimum** you should use. An aisle 1.22 m (48 in) wide will

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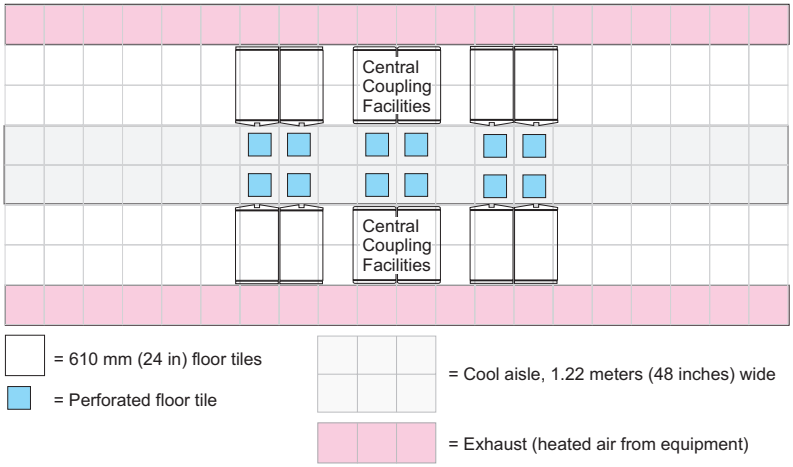
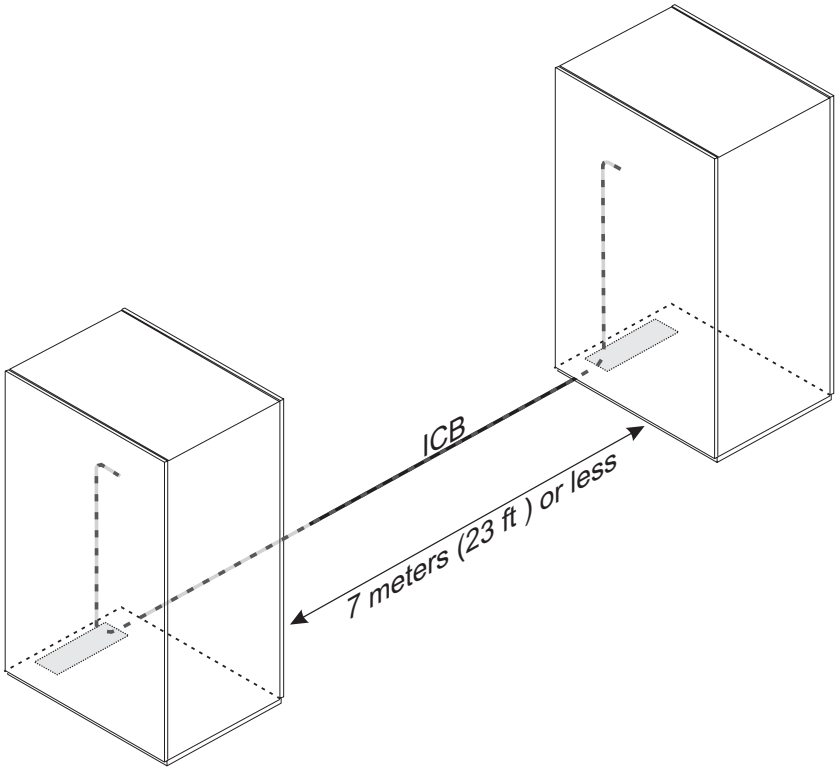
better serve the cooling and cabling needs of a Parallel Sysplex configuration.

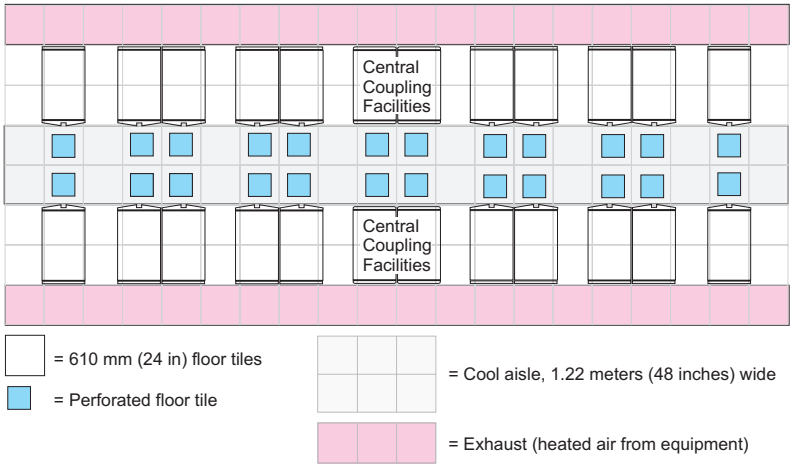

Central Coupling Facilities
Central Coupling Facilities
= 610 mm (24 in) floor tiles
= Perforated floor tile
= Cool aisle, 1.22 meters (48 inches) wide
= Exhaust (heated air from equipment)

3. Sysplex connections will be made using ISC-3 and ICB-3 link cabling.

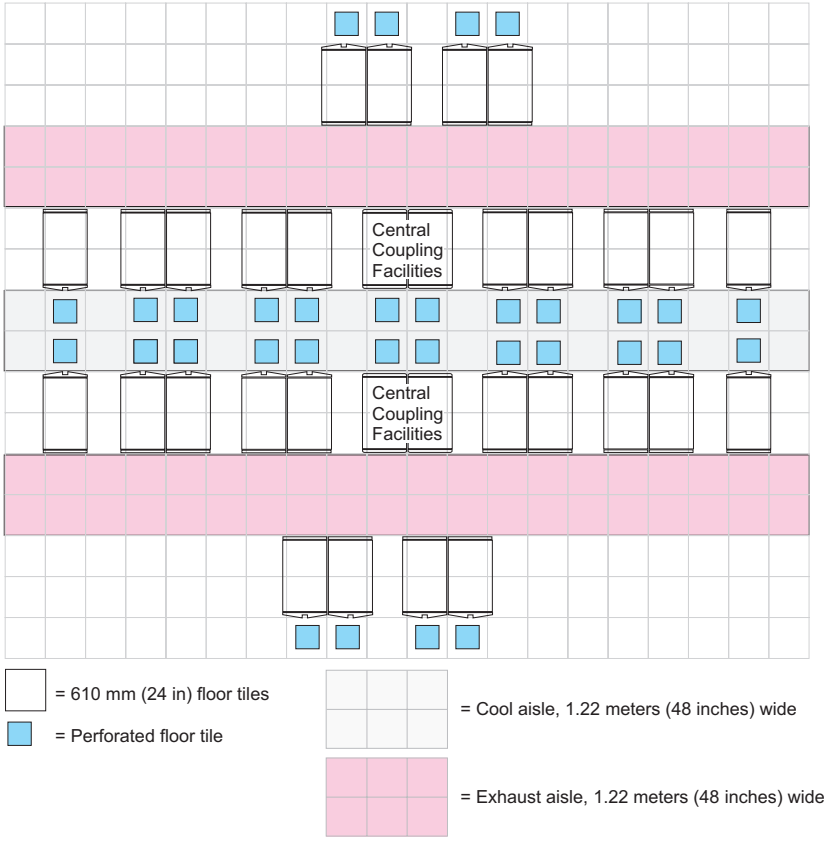
   Note: Integrated cluster bus (ICB) links use a Self-Timed Interface (STI) to perform coupling communication between systems. If you are planning to install integrated cluster bus channels, you will have to place connected devices closer to each other than 10 meters to allow for cable routing between equipment. Allow 7 meters maximum of real space between system frames.



4. As the Parallel Sysplex grows, add new servers evenly on either side of the central coupling facilities.


Central Coupling Facilities
Central Coupling Facilities
= 610 mm (24 in) floor tiles
= Perforated floor tile
= Cool aisle, 1.22 meters (48 inches) wide
= Exhaust (heated air from equipment)

5. As the Parallel Sysplex evolves, you may eventually exceed the 7 meter usable length of ICB cables at the ends of a two-row configuration. At this point, it may be possible to add a third and fourth row, using ISC links, which provide connectivity over greater distances than ICB links. With the equipment in these new rows centered on the original central coupling facilities, the Parallel Sysplex now assumes the shape of a diamond.


Central Coupling Facilities
Central Coupling Facilities
= 610 mm (24 in) floor tiles
= Perforated floor tile
= Cool aisle, 1.22 meters (48 inches) wide
= Exhaust aisle, 1.22 meters (48 inches) wide

By following these guidelines, you will be able to configure a Parallel Sysplex, using the minimum amount of floor space, that meets your performance and availability objectives. The use of technology combinations - zSeries 990, zSeries 900 (both single and double frame systems), zSeries 800, and Enterprise Server G5/G6

servers and coupling facilities - may complicate your physical planning, but the basic strategies outlined here will result in a successful Parallel Sysplex environment.

Appendix A. IBM Standard Symbols

In Plan Views:

Cable Entry and Exit Area in the base of the machine. Locating dimensions are measured from the edge of the frame, not the cover. This does not indicate the floor cutout.

Cable Exit Area, recommended

Power Cord exit, 50/60 Hz

Power Cord exit, 400 Hz

Power cords are supplied in 4.2 m (14 ft) lengths unless otherwise noted on the specification page. The length is measured from the symbol ⊕ or ◒.

Swinging Gate

Standard equipment outline
(shows the machine with covers closed)

Optional equipment outline

CE
Customer Engineer
Indicator Panel

In Cabling Schematics:

801
800
Indicates a cable group coming from a machine

503
504
Indicates a cable group going to a machine

Service Area Boundary
(Service clearances are measured from the machine with covers closed)
(Without feature)

Casters
Locating dimensions are measured from the edge of the frame, not the cover.

Leveling pads or glides
(90 mm [3 1/2 in] typical diameter)
Locating dimensions are measured from the edge of the frame, not the cover.

Legs

Non-raised floor cable exit

M
Meter location

Unit Emergency Switch

Hinged Covers

Single

Bifold

Offset Bifold

Figure A-1. IBM Standard Symbols

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Appendix B. Environmental Specifications

Unless otherwise noted on individual specification pages, the following environmental specifications, based on an altitude from sea level to 2134 meters (7000 feet), apply:

Figure B-1. Table - Environmental Specifications

Environment, Operating:	
Temperature	10° to 35°C (50°F to 95°F)
Relative Humidity	20% - 80%
Maximum Dew Point	21°C (70°F)
Environment, Nonoperating:	
Temperature	10°C to 52°C (50°F to 125°F)
Rel Humidity	8% - 80%
Maximum Wet Bulb	27°C (80°F)
Maximum Dew Point	21°C (70°F)
Environment, Shipping:	
Temperature	-40°C to 60°C (-40°F to 140°F)
Relative Humidity	5% - 100% (no condensation)
Maximum Wet Bulb	29°C (84°F)
Environment, Storage: All Models	
Temperature	1°C to 60°C (34°F to 140°F)
Relative Humidity	5% -80%
Maximum Wet Bulb	29°C (84°F)

Note:

Prior to the installation of an IBM system, careful consideration should be given to the computer room environment. If there is any question about potential corrosive gases or level of particulates, contact your IBM representative for assistance in monitoring the environment.

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Appendix C. Acoustics

This appendix provides information on acoustics for the zSeries 800.

Acoustical Noise Emission Levels

Relevant International Standards:

- Measurements: ISO 7779
- Declaration: ISO 9296

Table C-1. Table - Declared Acoustical Noise Emission Values

	L_{WAd}		L_{pAm}		$<L_{pA}>_m$	
Configuration	**Operating (B)**	**Idling (B)**	**Operating (dB)**	**Idling (dB)**	**Operating (dB)**	**Idling (dB)**
All models	6.9	6.9	N/A	N/A	52	52

Note:

L_{WAd} The declared (upper limit) sound power level for a random sample of machines.

L_{pAm} The mean value of the A-weighted sound pressure levels at the operator position (if any) for a random sample of machines.

$<L_{pA}>_m$ The mean value of the A-weighted sound pressure levels at the one-meter (bystander) positions for a random sample of machines.

N/A Not applicable (no operator position).

B, dB Abbreviations for bels and decibels, respectively.

All measurements made in accordance with ISO 7779, and reported in conformance with ISO 9296.

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Appendix D. Dual Power Installation

The zSeries 800 models are designed with a fully redundant power system. Each computer has two line cords attached to two power input ports which, in turn, power a fully redundant power distribution system within the computer. To take full advantage of the redundancy/reliability that is built into the computer system, the system is intended to be powered from two distribution panels.

IMPORTANT

Each power cord is intended to be supplied by a different source.

Since the zSeries 800 operates on single-phase power, power redundancy is realized **only** if the source to each line cord is different. Failure to provide separate power sources will lead to system failure in the event of a power outage.

Here we will present three examples of redundancy.

Example 1 (redundant distribution panel and switch gear)

In this example, the computer receives power from two separate power distribution panels. Each distribution panel receives power from a separate piece of building switch gear. This level of redundancy is not available in most facilities.

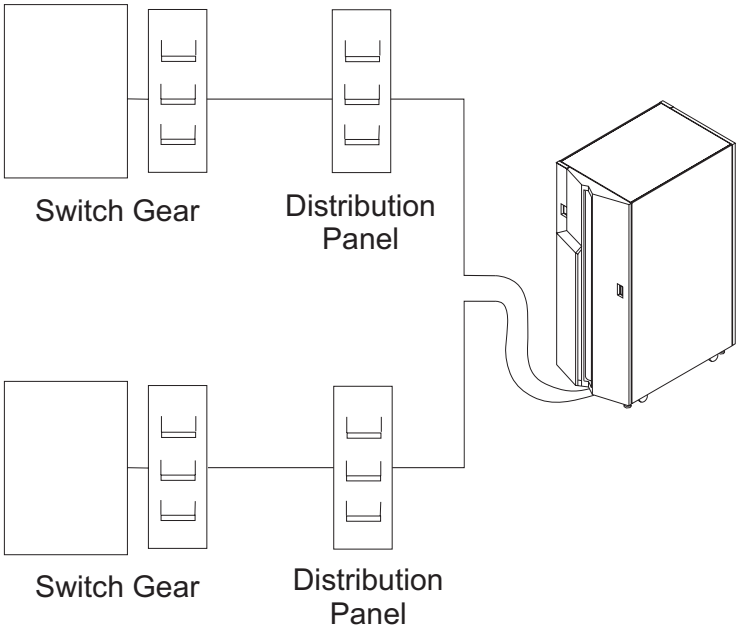

Figure D-1. Dual Power Installation - Redundant Panel and Switch

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Example 2 (redundant distribution panel)

In this example, the computer receives power from two separate power distribution panels. The two distribution panels receive power from the same piece of building switch gear. Most facilities should be able to achieve this level of redundancy. In this case, loss of switch gear (building power) will result in system outage, but loss of one distribution panel will not.

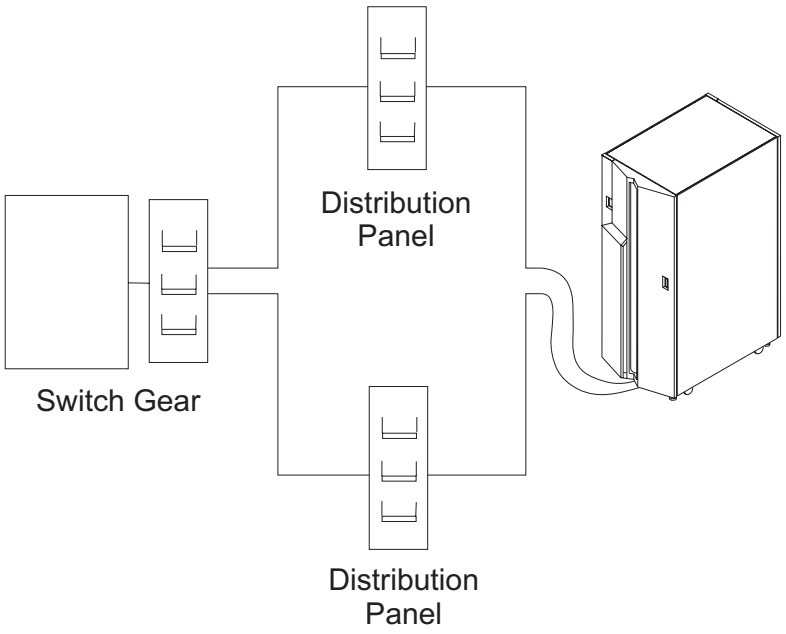

Figure D-2. Dual Power Installation - Redundant Panel

Example 3 (single distribution panel)

In this example, the computer receives power from two separate circuit breakers in a single power panel. This does not make use of the redundancy provided by the processor. It is, however, acceptable if a second power distribution panel is not available.

This type of power distribution will result in system outage in the event of a power failure at either the switch gear or the distribution panel.

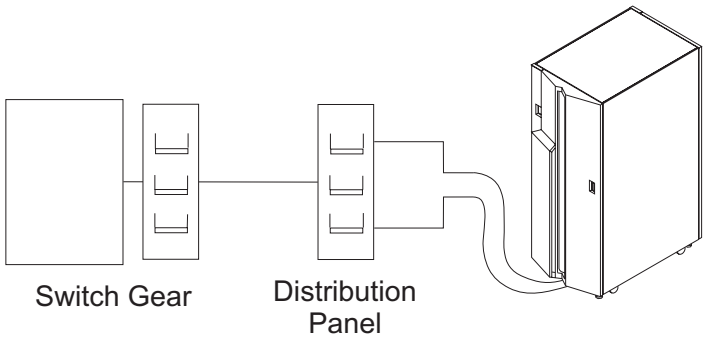

Figure D-3. Single Distribution Panel - Dual Circuit Breakers

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Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions contained in the installation manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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This equipment does not exceed Class A limits per radio noise emissions for digital apparatus, set out in the Radio Interference Regulation of the Canadian Department of Communications. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the owner or operator to take whatever steps are necessary to correct the interference.

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Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die IBM Deutschland GmbH, 70548 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:

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